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Rhodora

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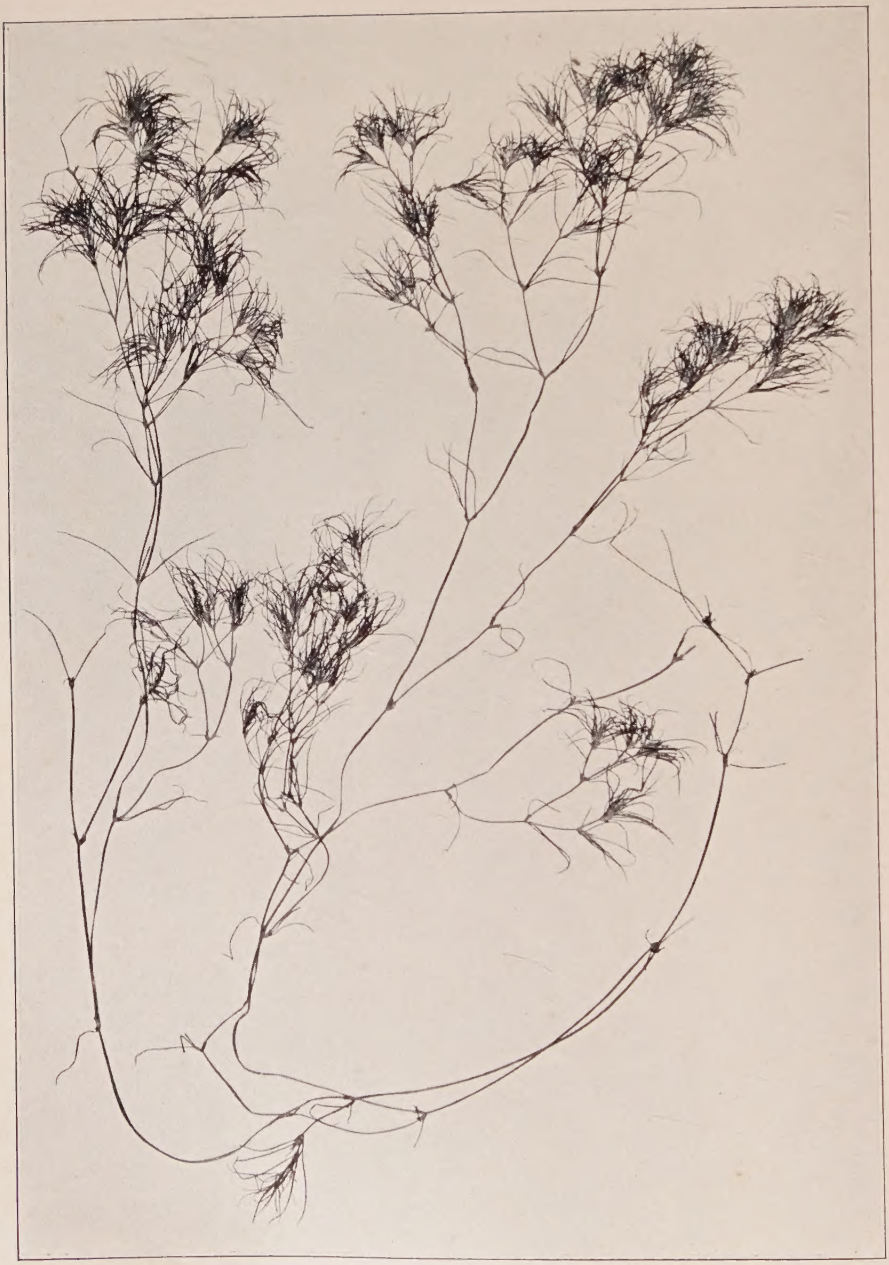

Najas minor: plant, × ⅖, from New York.

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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STUDIES IN THE GENUS NAJAS IN THE NORTHERN UNITED STATES

R. T. Clausen

(Plates 437 and 438)

During the last few summers, while investigating the aquatic vegetation of some of the waters of New York for the New York State Conservation Department, Division of Biological Survey, Dr. W. C. Muenscher and the writer have collected a considerable amount of material of species of *Najas*. These collections, including one old world species previously unknown in North America, afford us a much fuller picture of the distribution of the genus in New York than has been previously possible. The writer has also had opportunity to collect in various parts of New Jersey, where several new stations were discovered for the rarer species of *Najas* in that state. This field work has led to a rapid survey of the material of *Najadaceae* preserved in the larger eastern herbaria. All of the collections of *Najas* available at the Gray Herbarium, the National Herbarium, the herbarium of the New York Botanical Garden, and the herbarium at Cornell University have been examined. The writer wishes here to express his appreciation to the authorities of these institutions for the privilege of availing himself of their facilities. As a result of these herbarium studies, it has been possible to gain a general idea of the ranges of our North American species of *Najas* as they are at present known.

Najas has probably been as much misidentified and misplaced in herbaria as any group of the narrow-leaved type of aquatics. It is not unusual in going through a collection of this genus to find placed in the covers labelled *Najas*, specimens of genera of the *Characeae*, narrow-leaved *Potamogeton, Zannichellia, Lagrosiphon, Elodea,* and even *Ceratophyllum*. Consequently one is never sure that he has seen all of the material in a given herbarium, because there is always the possibility of specimens of *Najas* being misplaced in the covers of any of these other genera. A student of *Najas* must be prepared to look in a variety of places for the objects of his study.

Important contributions to the knowledge of the genus have been made by Magnus,[1] Rendle,[2] and Fernald.[3] Magnus was particularly interested in the anatomy of the group. His thesis for the degree of Doctor of Philosophy from the University of Berlin was a "*Beitrage zur Kenntniss der Gattung Najas L.*" Prof. Fernald has called attention to the best characters by which the northern North American species may be recognized and has defined their ranges. Rendle's monograph represents the most recent attempt to treat the *Najas* flora of the world. He provided keys and detailed statements of ranges as they were known at the time when he was writing. He listed four species as native to North America; *N. marina, N. flexilis, N. microdon* (*N. guadalupensis*), and *N. gracillima*, *N. conferta,* now known from southern Florida, was reported by him from Cuba and Brazil. *N. minor,* which is now recorded from North America, was noted from Europe, Asia, and northern Africa. Since Rendle's paper, no new species of *Najas* has been described from North America until 1935, when Rosendahl and Butters[4] published *N. olivacea* from Minnesota. In the following discussion this species will be mentioned under *N. guadalupensis.*

In preparing a key to our northeastern forms, it was found that characteristics such as length and breadth of seeds, leaves, and stems, though often of great help relatively in making determinations, are subject to great variation. Statements of size to tenths of millimeters are of little value when measurements of structures in the same species may vary several whole millimeters plus or minus.

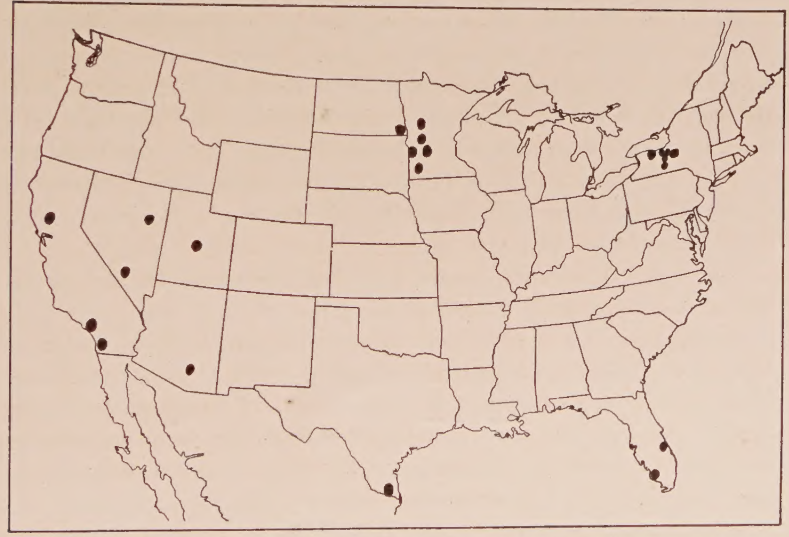
Key to the northeastern North American Species of Najas

1. Leaves coarsely and conspicuously toothed (spines discernible without a lens). Internodes and backs of leaves often spiny. Seeds large, usually 4–5 mm. long, 2–3 mm. wide, finely reticulate. Plants dioecious........................*N. marina.*

1. Leaves almost entire or finely toothed (spines usually not discernible without a lens). Internodes and backs of leaves never spiny. Seeds more slender and smaller, 4 mm. long or less, 2 mm. wide or less. The seed-coat variously reticulate. Plants monoecious....2.

2. Leaf-bases broadly and truncately lobed or auriculate. . . .3.
    3. Leaf-bases broadly and truncately lobed. Areolae of seed-coat much broader than long, arranged in regular vertical rows. Leaves somewhat recurved. . . . . *N. minor.*
    3. Leaf-bases auriculate and scarious, decidedly spiny-toothed. Seeds very slender, often with a slight tendency to be curved. Areolae longer than broad, sunken in, giving the seed-coat a decidedly roughened appearance. Leaves not recurved. . . . . *N. gracillima.*
2. Leaf-bases not broadly and truncately lobed or auriculate, but little enlarged and sloping. . . .4.
    4. Seed-coat smooth and lustrous, very finely reticulate (30–40 rows of areolae across the seed). Styles long and filiform, 1 mm. or more long. Leaves finely and closely spined. . . . . *N. flexilis.*
    4. Seed-coat dull, coarsely areolate, 10–20 rows of areolae across the seed. Styles short and stout, 0.5 mm. long or less. Leaves usually finely, but remotely spined. *N. guadalupensis.*

N. MARINA L. Prof. Fernald[5] has well discussed the distribution of this species in New York state. Since 1923 no new collections of *N. marina* have been made in the Atlantic coastal region north of Florida, although the species might be expected to be found in many places between New York and Florida.



MAP. 1. Range of NAJAS MARINA in the United States.

In the middle western region, particularly in Minnesota and in North Dakota, a number of collections have been made. Rosendahl and Butters[6] mention the occurrence of *N. marina* at Lake Minnewaska, Pope Co. and at Big Stone Lake, Big Stone Co., Minnesota. Other collections from this state include: *I. V. Shunk & W. E. Manning* 539, North Ten Mile Lake, Ottertail Co.; *Jones & Hotchkiss* 4002, Upper Norway Lake, Kandiyohi Co.; *F. P. Metcalf* 1966, Kandiyohi Lake, Kandiyohi Co.; *F. P. Metcalf* 1986 & 1972, Wagonda Lake, Kandiyohi Co.; and *F. P. Metcalf* 1841, Glacier Lake, Murray Co. Metcalf has also collected this species at Elsie Lake (M. 60) and at Mud Lake (M. 148), both near Hankinson, North Dakota.

No material from Michigan has been seen.

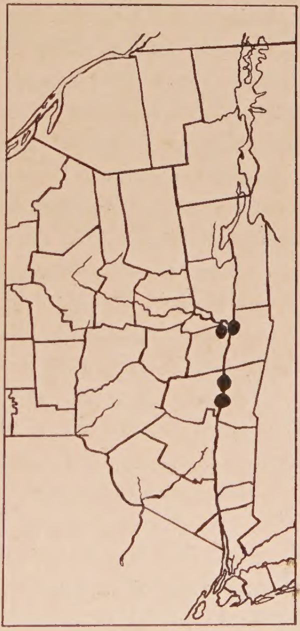
From Florida the writer has studied material from two different stations: *A. H. Curtiss* 2705, Palm Creek near Cape Romano; and *E. Palmer* 533, Sand Point, Indian River. Morong's var. *gracilis*, exemplified by the Palm Creek collection of Curtiss and by part of the Palmer collection, seems merely to be a narrow-leaved form of the typical *marina*. The rest of the Palmer collection is the broad-leaved form which matches exactly specimens from central New York.

West from Florida, the species has not been collected any nearer than 15 miles north of Brownsville, Texas, where it was secured by *Robert Runyon*, no. 187. Another Texan collection is "Las Frosnos in Risoco," *Runyon*, no. 185. From the West material has been seen from the Santa Cruz River in Arizona; Central Utah; Ash Meadows and the Huntington Valley in Nevada; and from three stations in California, the northernmost of these being *H. N. Bolander*, 2658, Clear Lake, Lake Co.

Material of *N. marina* has also been examined from Lower California; Guaymas, Sonora, Mexico; Cuba; Haiti; Porto Rico; Salvador; Venezuela; France; Norway; Sweden; Germany; Austria; Hungary; Italy; Sicily; Egypt; Belgian Congo; Asia Minor; Afghanistan; India; Manchuria; Japan; Hawaiian Islands; and Galapagos Islands. Rendle has described many geographical varieties, but attempts by the writer to place the forms from the aforementioned localities in their respective regional races has proved highly unsuccessful. So much material is now available as to break down the fine distinctions made by Rendle, who evidently had only single specimens in many cases on which to base his varieties. A detailed study of the forms of *N. marina* must be carried out before specific statements may be made as to the subdivisions of the species and their distribution.

N. minor Allioni. While collecting in the waters of the Hudson River at Troy and Waterford, at the mouth of the Mohawk River, on August 21 and 22, 1934, great beds of a strange species of *Najas* were discovered by Dr. W. C. Muenscher and the writer. The plants were bushy and much branched, growing in shallow water, and had a characteristic appearance because of the recurved habit of the foliage. The leaves were slender, but not so much so as in *N. gracillima,* and relatively coarsely spined. A week later, we found the same plant growing on a tidal mud-flat about one mile south of Stuyvesant, Columbia Co., New York. Finally, on September 3, we found the plant in the Watervliet Reservoir in Albany Co. See PLATE 437.

When we worked over our 1934 collections later in the year, we were puzzled by the specimens of this *Najas.* Was it an aberrant form of *N. gracillima,* a new species, or another tropical or sub-tropical form, which, like *N. guadalupensis,* was reaching its northern limits in our area? The scarcity of fruits on our specimens served to support this last line of reasoning. The writer tried to match the specimens with material of *N. conferta* from Florida, but this did not work at all. Turning through Rendle's treatment in Engler's "Das Pflanzenreich," we noted fig. 1 D, showing the habit of *N. minor,* and fig. 4 S and T, showing the seeds, fresh and fossil, of the same species. Here was our plant depicted, with the same habit and transversely reticulate seeds as had been observed in the Hudson River material! Our plants matched exactly European specimens of *N. minor.*



MAP 2. Range of NAJAS MINOR in New York.

Although the 1934 material exhibited a paucity of fruits, collections at Troy and Waterford in September, 1935, by W. C. Muenscher and O. F. Curtis, jr. contained specimens which were abundantly fruiting.

Recalling Svenson's[7] collection of *N. gracillima* in the shallow water of the Hudson above Waterford, we wondered whether this might not also be *N. minor.* Examination of this material at the Gray Herbarium, however, showed it to be typical *N. gracillima.* A search through the *Najas* material of several eastern herbaria failed to reveal any further specimens of *N. minor* from North America. Specimens from the herbarium of George Engelmann of St. Louis, Mo. were collected by A. Braun in Berlin, in 1865.

Najas minor is undoubtedly of recent introduction in New York. The fact that none of the many other botanists who have worked over this area had ever collected it would seem to support this view. There are several ways by which the plant may have come in. Seeds or parts of the plants themselves may have been brought here on shipping from Europe. There is even the possibility that the plant had been grown in an aquarium and then dumped into the river. Intentional introduction is possible but not likely. On September 14, 1935, Dr. W. C. Muenscher threw fragments of plants of *N. minor* into the shallow water of Cayuga Lake off the Canoga Marshes. *Najas marina* is common in this part of the lake. Whether *N. minor* will thrive there remains to be seen.

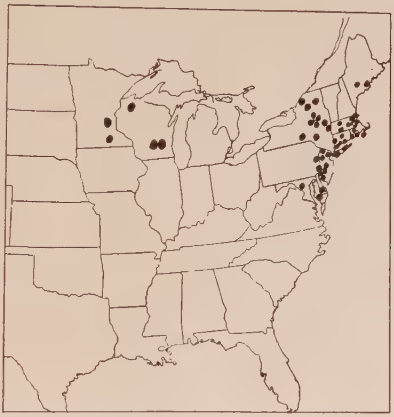
In the herbarium, *N. minor* may be at once recognized by its very narrow, coarsely toothed leaves, with broadly truncate bases. The seeds are slender, 2–3 mm. long and .4–.6 mm. wide, with vertical rows of numerous areolae, which are much broader than long, giving the seed-coat a scalariform appearance.

The following collections, all in New York, may be cited: *Muenscher and Clausen* 4279, mouth of Mohawk River at Waterford, Saratoga Co., August 21, 1934; *M. & C.* 4281, mouth of Mohawk River at Waterford, Saratoga Co., August 22, 1934; *M. & C.* 4282, Watervliet Reservoir, Albany Co., September 3, 1934; *M. & C.* 4280, tidal mud flat about one mile south of Stuyvesant, Columbia Co., August 28, 1934; *M. & Curtis* 4825, backwater of Mohawk River, Waterford, Saratoga Co., September 10, 1935; and *M. & Curtis* 4826, junction of Mohawk and Hudson Rivers, Troy, Rensselaer Co., September 10, 1935. Plants of *N. minor* were also found on the mud-flat in the river between Hudson and Athens, in Greene Co. Unfortunately, the material from this station was not preserved.

Material of *N. minor* has been examined from France, Germany, Austria, Hungary, Egypt, India, the Malay Peninsula, and Japan.

N. gracillima (A. Br.) Morong. The experience of intensive collecting during the last few years would seem to indicate that *N. gracillima* is not nearly so localized as was first supposed. The plant is very characteristic in appearance and can not be confused with any of the other native species of the genus, although certain puzzling forms, possibly of hybrid origin, can not be satisfactorily placed.

In New York, *N. gracillima* was first collected in the ponds west of Albany by C. H. Peck. Since then it has been found at several places on Long Island and in the watersheds of the Hudson, Mohawk, Indian, Grass, Raquette, Delaware, and Susquehanna Rivers. It has also been collected in the Lake Champlain watershed. In 1934, Muenscher and Clausen[8] listed several inland stations in New York for *N. gracillima*. To these may now be added the following: *M. & C.* 4274, Middle Stoner Lake, Fulton Co.: *M. & C.* 4275, Canada Lake, Fulton Co.; *M. & C.* 4276, East Caroga Lake, Fulton Co.; *M. & C.* 4277, Lily Lake, Fulton Co.; and *M. & C.* 4278, Glass Lake, Rensselaer Co. In 1935, Muenscher and Curtis collected the species in two new localities; M. & C. 4822, Mutton Hill Pond, Apalachin, Tioga Co., in the Susquehanna Watershed; and M. & C. 4828, Round Lake near Roscoe, Sullivan Co., in the Delaware Watershed. In the Gray Herbarium is a collection by H. K. Svenson, no. 1904A, from Franklin Co., N. Y. This is a single fragment of *N. gracillima* collected with Potamogeton in the shallow water at the north end of Loon Lake on Aug. 24, 1927.



MAP 3. Range of NAJAS GRACILLIMA.

M. & C. no. 4275, from Canada Lake, Fulton Co., N. Y. consists of two things collected together and growing side by side. The one is typical *Najas gracillima*. The other is a slender form with *flexilis*-like fruits. The seeds are 2–2.2 mm. long, the seed coats smooth and polished, and the style in flowering material 1.5 mm. long. The sheath of the upper leaf at each node is lobed and sharply toothed with 6–8 slender spines. The leaves and stems are capillary. This material may be either *N. tenuissima*, a European species native in Finland, which it matches pretty well, or a hybrid between *N. flexilis* and *N. gracillima.* There seems to be no good reason why species of Najas should not cross, although no examples of this have until now been described. Certainly our Canada Lake specimens seem to be entirely intermediate between the two above species. M. & C. 4265, from Pine Lake, Fulton Co. exhibits this same intermediate character.

Inland in Massachusetts *Najas gracillima* is now known from Wood Pond, Ludlow, Hampden Co., where it was collected on the muddy pond bottom by F. C. Seymour, no. 427, on Aug. 25, 1925. It has also been collected in a pond at Deerfield, Franklin Co. by Walter Deane, on Aug. 10, 1887.

In New Jersey Svenson[9] collected *N. gracillima* in a pond hole east of Cedar Lake. In his note in RHODORA he also mentioned the four other classical New Jersey stations for the species: Delanco, Burlington Co.; mouth of Cooper's Creek, Camden Co.; Palatine, Salem Co.; and Woodstown, Salem Co. The writer has seen material from all of these stations except the one at Palatine. There are two other collections from the state which until now have apparently been overlooked. These were both by K. K. Mackenzie; no. 5691, shores of Delaware River at Kinkora, Burlington Co., Sept. 1913; and no. 6288, south end of Denmark Pond, Morris Co., Sept. 13, 1914. Sheets of these numbers are deposited in the herbarium of the New York Botanical Garden.

In 1935, *N. gracillima* was collected in a small sandy bottomed bay at the southern end of Green Pond, Morris Co., N. J., A. P. & R. T. Clausen, no. 1191. Here the species was growing in the typical association with which it was found in the Adirondack Lakes: *Isoetes Braunii*, *Potamogeton capillaceus*, *Eriocaulon septangulare*, *Brasenia Schreberi*, *Elatine minima*, *Utricularia purpurea*, and *Lobelia Dortmanna.*

Specimens collected by Taylor at Spotswood, Monmouth Co., N. J. and labelled *N. gracillima* are definitely not Najas. Material in the Mackenzie Herbarium labelled *N. gracillima* from Catfish Pond, Stillwater, Sussex Co., N. J. is *Potamogeton pectinatus.*

From Pennsylvania, *N. gracillima* is known from Bristol, Bucks Co. (Diffenbaugh, July 26, 1868) and from the Lehigh River at Easton, Northampton Co. (Morong, Aug. 7, 1891).

In the Atlantic coastal region, *N. gracillima* is also known from Delaware and Maryland. The following sheets may be cited: A. Commons, in Nanticoke River at head of tidewater, Seaford, Sussex

Co., Delaware, Aug. 31, 1882; Forrest Shreve and W. R. Jones 1200, Shad Point, Wicomico River, Wicomico Co., Md., Aug. 17, 1906; and W. L. McAtee 2766, pool at Widewater, Great Falls, Montgomery Co., Md., Aug., 1917.

W. N. Keck and C. F. Stillwell, no. 380, first collected *N. gracillima* in Minnesota on Aug. 2, 1926, at Dudley Lake in Rice Co. A year later, Rosendahl,[10] no. 5509, collected the species in a small lake in northwestern Ramsey Co. There are also three stations for Wisconsin.[11] In the herbarium of the New York Botanical Garden are some specimens of *N. gracillima* sent in a letter from Dr. Gray to Wm. Boott. These may have been obtained in Michigan, although there is some doubt about this possibility. Search should now be made for the plant in the area between Tioga Co., N. Y. and Wisconsin.

N. FLEXILIS (Willd.) Rostk. & Schmidt. This species, common in the northeastern part of the United States and eastern Canada, is exceedingly variable in appearance. In small, shallow ponds, it often assumes a squat bushy character, while in the waters of our rivers it develops long slender stems with slender leaves and even more slender fruits. There is great variation in the size and shape of the seeds of *N. flexilis*. The writer has tried to break up the species on a basis of seed characters, but all his attempts thus far have been unsuccessful. It was first thought that the coastal plain forms exhibited short plump seeds, while the inland forms had more slender, elliptical seeds. There are so many specimens available to disprove this idea that it had to be abandoned. Different forms of the species do occur, but the characters, such as width of leaves, size and shape of seeds, and habit, occur in all sorts of combinations and can not be correlated with geographical areas to give definite geographical races or varieties which are worth naming.

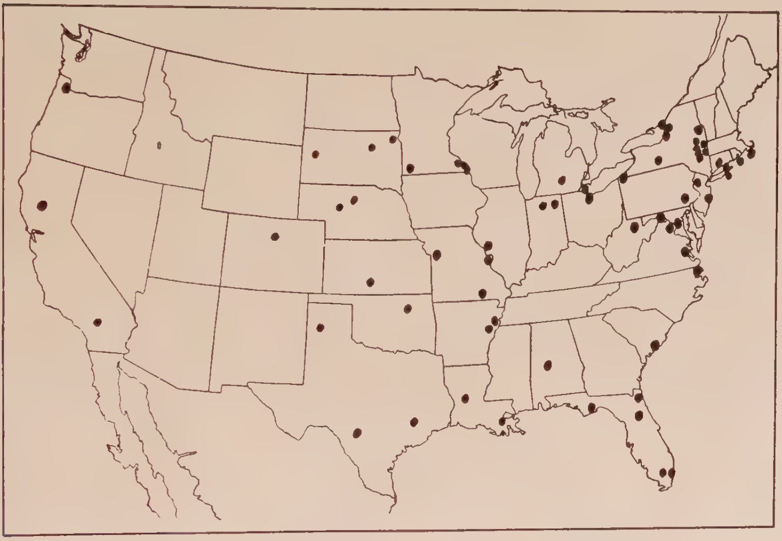
Prof. Fernald[12] stated that to the west of Iowa and Minnesota the species seems to be only in Idaho, Oregon, Washington, and British Columbia. I have at hand only two records for the area in between, and these both from South Dakota, adjoining Minnesota: Corbett and Williams, no. 12, in shallow water of Lake Hendricks, Aug. 8, 1894; and C. & W., no. 178, shallow water of Big Stone Lake, Aug. 15, 1894. The collection of F. P. Metcalf, no. 867, from Bull Lake, Boone Co., Missouri, seems to be *N. flexilis*, but material examined from Kansas and Nebraska seems to be highly questionable.

In the east, the southern limits of the range of *N. flexilis* are still poorly worked out. The collection, no. 2275 of W. L. McAtee, from Hunting Creek, Va. may possibly be *N. flexilis*, but the condition of the material is such that positive determination is well nigh impossible. There is a doubtful specimen from the vicinity of Washington, D. C., collected by Vasey in 1875. There is also another District of Columbia specimen which has much the appearance of *N. guadalupensis*, but styles 2 mm. long. Such specimens are difficult to place. The collection, Muenscher and Clausen no. 4273, from the mouth of the Mohawk River where it enters the Hudson at Waterford, Saratoga Co., N. Y., presents the same difficulty. The seeds are decidedly of the *flexilis*-type, 3.5–4 mm. long (!), the styles 1–1.2 mm. long, with the habit suggesting *N. guadalupensis.*

In New Jersey, on the coastal plain, Edwards and Clausen (1190) collected *N. flexilis* as far south as Toms River, Ocean Co., on the edge of the pine barrens. Material of *N. flexilis* has been examined from Newfoundland, Quebec, Ontario, New Brunswick, Nova Scotia, Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Ohio, Indiana, Michigan, Illinois, Minnesota, Iowa, South Dakota, Missouri, Idaho, Oregon, Washington, British Columbia, Sweden, and Germany.

N. GUADALUPENSIS (Sprengel) Morong. This seems to be an aggregate species. Certainly the material usually classified in herbaria under this name presents a decidedly heterogeneous aspect. Here as in *N. flexilis*, however, attempts by the writer to break up the species have been unsuccessful.

N. guadalupensis is a new world species, extending southward from Massachusetts, New York, and Quebec to Peru, Bolivia, and Argentina. In the northern part of its range, the species had been for a long time overlooked, probably partly because in the north it seldom produces fruit. Prof. Fernald[12] called attention to its occurrence in our northeastern flora and pointed out the characters by which it might be recognized; the short stout style and the dull, coarsely reticulate seed coat. In New York the plant was mentioned from Suffolk Co., L. I. and from Jefferson Co., at the extreme eastern end of Lake Ontario. A considerable number of New York collections have been made since 1923. These are cited here: Muenscher, Manning and Maguire 180, in deep water of South Bay, Lake Champlain, Fort Ann, Washington Co.; Muenscher and Clausen 4283, mouth of Mohawk River at Waterford, Saratoga Co.; M. & C. 4284, Nassau Lake, Rensselaer Co.; M. & C. 4285, Kinderhook Lake, Columbia Co.; M. & C. 4286, tidal mud flat in Hudson River between Hudson and Athens, Greene Co.; M. & C. 4287, tidal mud flat in Hudson River at Coeymans, Albany Co.; M. & C. 4288 & 4289, tidal mud flats in Hudson River at mouth of Stockport Creek, Columbia Co.; and C. 1192, 1193, and 1194, Waneta Lake, Schuyler-Steuben Co. *Najas guadalupensis* is one of the commonest species of aquatics in Waneta Lake, a small body of water, about three miles long, on the divide between the Ontario and Susquehanna watersheds. This lake naturally drained into the Susquehanna valley, but it has recently been diverted so that it now flows through a canal into Keuka Lake and thence into Ontario. Large quantities of the Najas collected here were almost entirely sterile. Only rarely were flowers found which made positive identification possible. Some of the Rensselaer County material contained fruits more commonly. The seeds were typical of those produced on plants from the southern states.



MAP 4. Northern Range of NAJAS GUADALUPENSIS.

In New Jersey, *N. guadalupensis* has seemed to be a great rarity. No specimens have been seen in herbaria and there are no published references to the species. Consequently, two recent collections seem worth recording: Edwards and Clausen 1195, shallow sandy pool along the Atlantic coast at Mantoloking, Ocean Co.; and Edwards, Bowen, Highton, Rusling, and Clausen 1196, Budds Lake, Morris Co.

On Aug. 2, 1933, Muenscher and Lefler collected a peculiar Najas (18239) in three to four feet of water off the Canoga Marshes in Cayuga Lake, N. Y. Specimens of this collection have been studied by the writer. The plants are slender, 40 cm. long or more, and somewhat bushy, rooting at the nodes. The leaves are lanceolate, abruptly acute, broad and sheathing at the base, and finely and sharply toothed with 50–75 teeth on a margin. The sheath of the upper leaf at each node is wider than that of the lower, and the sheaths are about 3 mm., with their margins finely spined, 8–12 spines on a side. The material is absolutely sterile.

In 1934 and again in 1935, attempts to rediscover the station for this plant and to secure fruiting material were spoiled by adverse weather conditions. The lake was so rough when we visited the spot in 1935 that we could not see anything in the water.

This Cayuga Lake material seems most closely related to *N. guadalupensis*, which the writer reluctantly labelled it. When *N. olivacea*[14] was published, we eagerly read the description of the species and compared it with our plants. So far as we can tell from non fruiting material, this collection from Cayuga Lake represents the same plant which Rosendahl and Butters have described. Until flowering and fruiting specimens have been secured and studied, a definite opinion can not be rendered on the validity of this form in our New York flora.

The collection of J. K. & G. K. Small, no. 4385, from the shores at the mouth of the Kissimmee River, at the northern end of Lake Okeechobee, Florida, probably represents an undescribed species, allied to *N. guadalupensis*. The seeds are 1.8–2 mm. long, .8 mm. wide, and roughly and coarsely reticulate. The styles are stout, .6–1 mm. long. The leaves are .8–1 mm. wide and 1.5–2 cm. long, regularly and coarsely toothed with 15–20 teeth on each margin. It is hoped that more material of this form may be collected before any further disposition of it might be made.

Material of *N. guadalupensis* has been examined from Massachusetts, New York, Quebec, New Jersey, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Florida, Ohio, Indiana, Michigan, Illinois, Minnesota, South Dakota, Nebraska, Kansas, Missouri, Arkansas, Alabama, Louisiana, Texas, Oklahoma, Colorado, Oregon, California, Lower California, Cuba, Haiti, Dominican Republic, Jamaica, Porto Rico, Guadaloupe, Curacao, Mexico, Guatemala, Honduras, Salvador, Nicaragua, Colombia, Venezuela, Peru, Bolivia, and Argentina.

The writer wishes to thank Dr. W. C. Muenscher for permission to study certain of his collections and for his hearty cooperation in the preparation of this paper.

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List of Cited References

1. Magnus, P. Beitrage zur Kenntniss der Gattung Najas. v–viii, 1–63. Berlin, 1870.
2. Rendle, A. B. A Systematic Revision of the Genus Najas. Trans. Linn. Soc. London. Ser. 2, **5** (Bot.): 379–436. pl. 39–42. 1899; Supplementary Notes on the Genus Najas. Trans. Linn. Soc. London. Ser. 2, **5** (Bot.): 437–444. 1900.
3. Fernald, M. L. Notes on the Distribution of Najas in Northeastern America. Rhodora **25**: 105–109. 1923.
4. Rosendahl, C. O. and Butters, F. K. Rhodora **37**: 345–348. 1935.
5. Fernald, M. L. Rhodora **25**: 106–107. 1923.
6. Rosendahl and Butters. Rhodora **37**: 345. 1935.
6a. Muenscher, W. C. New York Cons. Dept. Report. A Biological Survey of the Mohawk-Hudson Watershed. No. **9**: 244. 1935.
7. Fernald, M. L. Rhodora **25**: 109. 1923.
8. Muenscher, W. C. and Clausen, R. T. Rhodora **36**: 405. 1934.
9. Svenson, H. K. Rhodora **37**: 414. 1935.
10. Rosendahl and Butters. Rhodora **37**: 346. 1935.
11. Fassett, N. C. Rhodora **36**: 349–350. 1934.
12. Fernald, M. L. Rhodora **25**: 107. 1923.
13. Fernald, M. L. Rhodora **25**: 107–109. 1923.
14. Rosendahl and Butters. Rhodora **37**: 347–348. 1935.

Wiley's "Ferns of Northeastern United States."[1]—It is now possible to obtain a pocket manual of ferns of the same general character as Chester Reed's little guides to the birds. Miss Farida A. Wiley of the American Museum of Natural History has put out a slender, flexibly bound volume, 4 by 6⅜ inches, designed to fit comfortably into pocket or hand-bag and, with the aid of copious illustration, brief, strictly non-technical descriptions and a carefully worked-out key to sterile fronds, to furnish an easy and painless method of naming, in the field, the species to be met with in New England and the middle Atlantic states. The little book should help the beginner toward an acquaintance with ferns; but, in view of the fact that six of the drawings are misnamed, the statement in the foreword that "by a novel method[2] . . . even the uninitiated can readily identify ferns without fear of error" seems a bit too hopeful.—C. A. W.

[1] Wiley, Farida A. Ferns of Northeastern United States. Published by the author, 1936. 98 pp., many cuts. $1.00.

[2] Wherein the novelty lies is not explained, nor is it obvious.

STUDIES IN THE TAXONOMY AND DISTRIBUTION OF THE EASTERN NORTH AMERICAN SPECIES OF LOBELIA

Rogers McVaugh

(Continued from page 329)

14. L. **Gattingeri** Gray, Proc. Am. Acad. Arts Sci. XVII: 221. 1882. Type Locality: "Middle Tennessee" (LaVergne, Rutherford Co.). Type Specimen: *Curtiss 1637* (distr. as *L. leptostachys*); in Gray Herbarium. Stem erect, 15–55 cm. high (ave. about 30 cm.), unbranched, or often with 1–6 filiform upright axillary branches, each bearing a few flowers; green, or with a brownish-red tinge near the base; nearly smooth, except for a few chaffy hairs near the base, on the angles formed by the decurrent leaf-bases. Cauline leaves 1–7, very thin in texture, practically smooth, sessile or even somewhat clasping; ovate to oblong, broadest below the middle, obtuse or the upper short-acute, irregularly sharply and finely toothed; in size to 2.0 × 4.5 cm., the upper little smaller, with an abrupt change to the bracts of the inflorescence. Basal leaves if present 1–5, obovate, obtuse, nearly smooth, narrowed at the base. Annual, acc. to Mohr (1901). Inflorescence a terminal raceme, 5–27 cm. long (ave. about 15 cm.), usually distinctly secund, bearing 15–55 (ave. about 30) flowers upon short curved pedicels (4–6 mm. long in fruit), which are nearly smooth, each with a pair of inconspicuous bracteoles near the base. Flower-bracts smooth, linear, callose-denticulate, longer than the pedicel (8–10 mm. long or less). Calyx in anthesis campanulate, smooth, becoming long-campanulate in fruit, with a smooth, inflated appearance, 3.5–4.5 mm. across by 5–6 mm. long. Capsule ⅔ or more inferior, horizontal or somewhat pendent at maturity. Calyx-lobes narrowly lance-linear, about 5 mm. long, smooth, or rarely ciliate near the tip; auricles none, or in a few cases distinct, short-triangular. Flower 10–13 mm. long (ave. 12 mm.), including calyx. Corolla light violet-blue or lilac, smooth outside, pubescent inside at the base of the lower lip. Corolla-tube entire, except for the dorsal fissure; lobes of the lower lip broad-ovate, about as long as the tube; two upper lobes shorter, lanceolate. Filament-tube 2.0–3.5 mm. long, nearly smooth, united about half its length above, somewhat deflexed. Anther-tube 1.9–2.5 mm. long, bluish-gray, the two smaller anthers slightly tufted, the three larger usually pubescent on the backs.—Springy places of calcareous bluffs; cedar barrens. Now known only from three counties in the limestone region of central Tennessee. Flower May–June. Material seen: Tennessee: davidson: Nashville, *Gattinger* (ANS, G); rutherford: Rockville, *Sudworth*, May 1897 (US); LaVergne, *Gattinger* (Curtiss 1637*) (ANS, CM, G, M, Mo, NB, US). Many herbaria have specimens from LaVergne, collected by Gattinger and distributed in various ways. The type, *Curtiss 1637*,

is presumably from LaVergne, but is labelled merely "middle Tennessee" (seen in ANS, G, M). WILSON: Lebanon, *Biltmore herb.*, Aug. 1899 (US); Lebanon, *Pennell 11384* (ANS); *11391* (ANS, UP).

15. L. FLACCIDIFOLIA Small, Bull. Torr. Bot. Club XXIV: 338. 1897. TYPE LOCALITY: Ochlockonee River Swamp, Thomasville, Thomas Co., Ga. TYPE SPECIMEN: *Small*, Jy. 12–22, 1895; in New York Botanical Garden. Stem slender, erect, simple or with several filiform branches bearing a few flowers each, 30–90 cm. high, smooth or sparsely hirsute, green, or reddish below. Leaves cauline, thin, few–15, smooth, sub-entire, with numerous obscure shallow (often crenate) callose teeth; in size 0.5–1.5 × 5–11 cm., lanceolate or long-oblong, short-acute at the tip, mostly rather abruptly narrowed at base, the lower short-petiolate. Floral bracts definitely smaller than the leaves; larger leaves well below the inflorescence. Inflorescence a loose terminal raceme, sometimes plainly secund, few–30 cm. long, bearing 3–20 flowers (when branched, the branches developing later than the main inflorescence, with 1–8 flowers each). Pedicels rough, slender, curved, 4–11 mm. long in fruit, each with a pair of conspicuous green smooth or ciliate bracteoles near the middle or below. Flower-bracts linear, smooth, denticulate, about equalling the pedicels. Calyx in anthesis short-campanulate, somewhat rough-puberulent, becoming hemispheric in fruit, strongly ribbed. Capsule more than half inferior, longer than wide, 4–6 mm. in diameter. Calyx-lobes narrowly sagittate, acute or acuminate, ciliate, usually glandular-toothed, 3–5 (7) mm. long; auricles reflexed, round, small, but conspicuous, 1 mm. or less long. Flower 14–19 mm. long (ave. 15–16 mm.), including calyx. Corolla blue, pubescent outside or smooth, the lower lip somewhat pubescent at the base, with two tubercles. Corolla-tube entire, except for the dorsal fissure, or fenestrate; lobes of the lower lip oblong or narrow-ovate, nearly as long as the tube; two upper lobes lanceolate, erect. Filament-tube 5–6 mm. long, pubescent below, connate more than half its length above. Anther-tube 2.0–2.5 mm. long, bluish-gray, the two smaller anthers tufted at the tips, the three larger pubescent on the backs.—River swamps, Coastal Plain, Georgia, northern Florida, Alabama. Flower June–September. Material seen: GEORGIA: COLQUITT: Moultrie, *Harper 1676* (Mo, NB). JOHNSON: Wrightsville, *Harper 1341* (Mo, NB); (most of these specimens are not to be distinguished from *L. Halei* Small). THOMAS: Thomasville, *Small*, Jy. 1895 (NB). FLORIDA: "Ad ripas fluv. Ocklockonne," *Rugel*, Jy. 1843 (NB). OKALOOSA: Milligan, *Curtiss 6855* (Del, M, Mo, NB, UP). ALABAMA: MOBILE: Spring Hill, *Graves 1273* (Mo).

There is some evidence to show that this species and the next are the same, and intergrade freely (cf. the plant cited above, *Harper 1341*). However, *L. flaccidifolia* differs by the thinner, more oblong leaves, greater tendency to branch, smaller and more numerous flowers, and a somewhat later flowering period; in view of these differences, it seems best to keep them as separate species, at least until more material is seen.

16. L. Halei Small, Fl. S.E.U.S. 1145. 1903. Type Locality: "wet prairies, western Louisiana; Texas, near Houston." Type Specimen: authentic material, collected by J. Hale at Alexandria, La., and identified by Asa Gray as *L. Ludoviciana*, seen at the Gray Herbarium.—*L. Ludoviciana* Gray, Proc. Am. Acad. Arts Sci. XII: 60. 1877; not *L. Ludoviciana* Wood, Class Book 476. 1861.—Stem erect, smooth or nearly so, simple or with 1–2 stout upright branches, 30–100 cm. high, green, or reddish near the base. Cauline leaves few–20, smooth, somewhat appressed to the stem, the lower petiolate; oblanceolate, short-acute below, about 1.0 × 5–8 cm.; becoming lance-acute above; subentire or sharply toothed. Upper leaves bract-like, distant; the larger leaves well below the inflorescence. Inflorescence a terminal raceme to 35 cm. long, not noticeably secund, loosely 5–30 flowered. Pedicels rough, curved, 5–8 mm. long in fruit, each with a pair of conspicuous green smooth or ciliate bracteoles about the middle or below. Flower-bracts smoothish, linear, callose-denticulate, about as long as the pedicels. Calyx in anthesis short-campanulate or hemispheric, rough-puberulent, becoming hemispheric in fruit, strongly ribbed, about 4.5 mm. in diameter. Capsule half inferior, longer than wide. Calyx-lobes broad-sagittate, flat, acute or acuminate; smooth, at least near the tip, usually callose-denticulate, 4–6 mm. long. Auricles round, conspicuous, less than 1 mm. long. Flower 15–20 (22) mm. long, including calyx. Corolla blue, pubescent outside, the lower lip pubescent at the base inside. Corolla-tube entire except for the dorsal fissure; lobes of the lower lip ovate, short-acute, nearly as long as the tube; two upper lobes lanceolate, shorter, erect. Filament-tube 6–8 mm. long, pubescent below, connate above. Anther-tube 2.5–3.0 mm. long, light bluish-gray, the two smaller anthers densely white-tufted at tip, the three larger heavily pubescent on the backs.—Wet prairies,

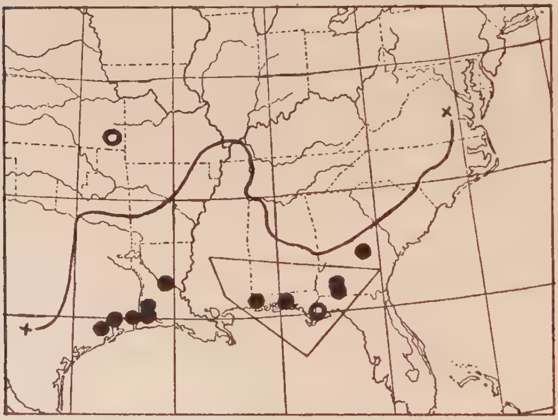

Fig. 24. Range of Lobelia Halei (unframed) and (framed) of L. flaccidifolia. Open dots represent doubtful records.

usually in sandy soil, Coastal Plain, Louisiana and eastern Texas; doubtfully north to Kansas. Flower April–July. Material seen: LOUISIANA: "Cigers Point, W. La.," *Langlois*, May 1886 (NB). CALCASIEU: Sulphur, *Palmer 7722* (NB); DeQuincy, *Pennell 10226* (UP). RAPIDES: Alexandria, *J. Hale* (ANS, G, NB). TEXAS: *F. Lindheimer, Fasc. I. 116.*, ann. 1843 (ANS). HARRIS: Houston, *Lindheimer 41* (Mo). LIBERTY; *Tharp 2506* (US). ORANGE: Orange, *Tharp 2733* (US). KANSAS: LABETTE: Parsons, *Letterman*, Jy. 1880 (Mo); this specimen is apparently *L. Halei*, but there may be some confusion as to locality.

17. L. FLORIDANA Chapman, Bot. Gaz. III: 9. Feb. 1878. TYPE LOCALITY: "Margins of ponds and swamps in the pine forests of West Florida." TYPE SPECIMEN: material from Chapman seen in the New York Botanical Garden and the United States National Herbarium.—*L. paludosa* var. *floridana* Gray, Syn. Fl. II. pt. I: Suppl. 394. 1886.—Stem erect, slender, or rather coarse in large specimens, unbranched (or often with several stout upright or spreading branches, developing later than the main axis, and bearing fewer flowers); smooth, 50–150 cm. high (ave. 80–100 cm.), green or stramineous, less often purplish at base. Leaves basal, 1–10, smooth, strap-shaped, oblanceolate or lanceolate, acute or obtuse at tip, long drawn-out at base into margined petioles; to 2.5 × 40.0 cm. (ave. about 1 × 25 cm.); more or less upright; entire or shallowly crenate, or dentate with callose teeth. Stem-leaves bract-like, 3–4, lanceolate, 2–3 cm. long, acute, distant, callose-denticulate; the lowest sometimes larger, to 0.5 × 8.0 cm. Inflorescence a terminal raceme (sometimes with secondary, shorter racemes in branched individuals), 10–50 cm. long, loosely or rather densely 10–40 flowered (ave. about 25); not secund. Pedicels stout, rough, more or less upright, 3–6 mm. long in fruit, each with a pair of inconspicuous bracteoles at the base. Flower-bracts smooth, linear, shorter than the pedicels or equalling them, inconspicuous. Calyx in anthesis flattish or conic, usually rough under a lens, becoming hemispheric in fruit (some-

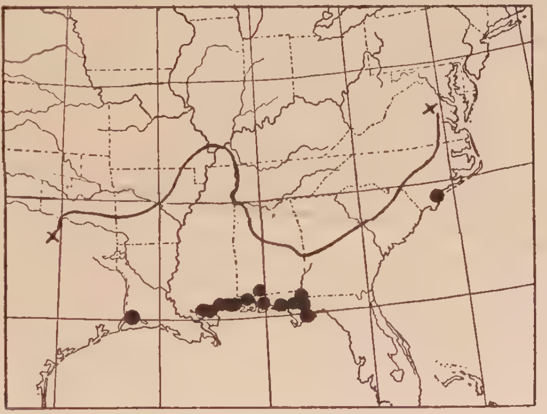

FIG. 25. Range of LOBELIA FLORIDANA.

times acute at base), about 4.0 mm. in diameter or larger. Capsule about ⅔ inferior, higher than broad. Calyx-lobes broad-lanceolate or deltoid, 2–6 mm. long, smooth, acute, usually callose-denticulate (often obscurely so). Auricles very small, triangular. Flower 13–20 mm. long (ave. 15–16 mm.), including calyx. Corolla blue, usually pubescent outside, the lower lip densely hirsute-pubescent at base inside. Corolla-tube entire except for the dorsal fissure (rarely fenestrate); lobes of the lower lip ovate, short-acute, reflexed, shorter than the tube; two upper lobes lanceolate, erect. Filament-tube 6–11 mm. long (ave. 7.5–9.0 mm.), strongly deflexed, pubescent below, connate more than half its length above. Anther-tube about 3.0 mm. long, light bluish-gray, the two smaller anthers tufted at the tips, the three larger merely pubescent on the backs.—Moist pinelands and borders of pineland and cypress ponds, often partially immersed; western Louisiana to north-western Florida and eastern North Carolina; near the coast. Flower May to August and September. Material seen: North Carolina: NEW HANOVER: Wilmington, *MacFarlane*, Jun. 1909 (UP). Florida: FRANKLIN: Apalachicola, *Chapman,* Biltmore herb. 4164a (NB, US). JACKSON: (probably Fla.); *Chapman*, Aug. 1838 (Torrey herb., NB). LIBERTY: *Biltmore herb.*, Aug. 1901 (US). SANTA ROSA: Milton, *Harper 45* (G, NB, US). WALTON: Point Washington, *Biltmore herb.*, Aug. 1891 (US). WASHINGTON: Chipley, *Curtiss 6851* (Del, M, NB, US). Alabama: ESCAMBIA: Flomaton, *Biltmore herb. 4164c* (US). MOBILE: Mobile, *Mohr* (US). Mississippi: HANCOCK: Bay St. Louis, *Dr. Ingalls,* Torrey herb. (NB). HARRISON: Biloxi, *Tracy 4942* (Mo). JACKSON: Ocean Springs, *Pollard 1058* (NB, US). Louisiana: CALCASIEU: Lake Charles, *Allison 283* (NB, US). ST. TAMMANY: Covington, *Bro. Arsene 11883* (NB, US).

18. L. PALUDOSA Nuttall, Gen. N. Am. Pl. II: 75. 1818. Type Locality: "In deep sphagnose swamps, from Sussex county in Delaware to Georgia." Type Specimen: authentic material in the Academy of Natural Sciences of Philadelphia. *L. pallida* Elliott, Sk. Bot. S. C. & Ga. I: 265. 1821 (in part). *L. nudicaulis* Rafinesque, Atl. Journ. I: 147. 1832.—In habit and vegetative characters hardly separable from *L. floridana,* but smaller; stem 20–135 cm. high (ave. 50–60 cm.); less freely branched; often purplish at base and at bases of leaves. Leaves basal, smaller, shorter (ave. size about 1 × 12 cm.), usually oblanceolate, short-acute (rarely with an ovate blade and a short petiole). Stem-bracts 1.0–2.5 cm. long (rarely 5.0 cm.). Inflorescence 2–35 cm. high (ave. about 15 cm.), loosely few–30 flowered (ave. about 15). Pedicels rough, not stiffly upright, rather slender, 5–9 mm. long in fruit, with no bracteoles visible under a lens. Flower-bracts shorter than the pedicels, linear. Calyx in anthesis conic, rough, becoming hemispheric in fruit, sometimes acute at base, 3.5–4.0 mm. in diameter. Capsule about ⅔ inferior, higher than broad. Calyx-lobes lanceolate or deltoid, acute, smooth, entire or callose-denticulate, about 3.0 mm. long. Auricles none or very small. Flower

11–16 mm. long, including calyx (ave. 12–13 mm.). Corolla light blue or nearly white, practically smooth outside, the lower lip densely hirsute-pubescent at base inside. Corolla-tube fenestrate; lobes of the lower lip ovate, little shorter than the tube, scarcely reflexed; two upper lobes lanceolate. Filament-tube 3.0–4.5 mm. long (ave. 3.5 mm.), hairy below, connate about half its length above, somewhat deflexed. Anther-tube 2–3 mm. long, light bluish-gray, the two smaller anthers tufted at tips, the three larger merely pubescent on the backs.

This species seems wholly distinct from the larger *L. floridana.* It may be distinguished by the shorter filament-tube, generally smaller size and smaller corolla; the fenestrate corolla; the absence of bracteoles on the pedicel.—Swamps and low pinelands and ponds, often partially immersed; southern Georgia and throughout peninsular Florida; reported (perhaps always upon the authority of Nuttall) from Delaware; the report may be based upon *L. Boykinii* T. & G., which occurs there. Flower February–May, or more or less throughout the year. Representative material seen: GEORGIA: CAMDEN: St. Marys, "*Bal.,*" Schweinitz herb. (ANS). CHARLTON: Traders Hill, *Small,* Jun. 1895 (NB). FLORIDA: ALACHUA: Gainesville, *Crawford,* Apr. 1897 (ANS, Duke). BREVARD: "Indian River," *Palmer,* ann. 1874 (US). BROWARD: Ft. Lauderdale, *Meredith,* Mar. 1917 (ANS). CLAY: Hibernia, *Canby,* Mar. 1869 (ANS, NB, US). DADE: Miami, *Small 3261* (NB). DUVAL: Jacksonville, *Curtiss 4715* (Del, M, NB, NYS, US). FRANKLIN: Apalachicola, *Chapman,* Biltmore herb. 2679b (NB, US). GULF: Wewahitchka, *Leeds,* Apr. 1933 (ANS). HILLSBOROUGH: Tampa, *Garber,* May 1876 (NB, US). INDIAN RIVER: Fellsmere, *Small 8912* (NB). LAKE: Eustis, *Nash 501* (ANS, Del, M, NB, US). LEE: Ft. Myers, *Miss Standley 40* (ANS, CM, NB, US). LEON (or WAKULLA): "inter Tallahassee & St. Marks," *Rugel,* May 1843 (NB). LEVY: Bronson, *J. D. Smith,* Apr. 1880 (US). MANATEE: Bradentown, *Tracy 6864* (NB, US). OSCEOLA: Kissimmee Prairie, *Mearns,* Apr. 1901 (US). PALM BEACH: "Ft. Lauderdale to Lake Okeechobee," *Small 4111* (NB). PINELLAS: St. Petersburg, *Williams,* Apr. 1926 (ANS). POLK: *J. D. Smith,* Apr. 1880 (US). PUTNAM: Palatka, *Williamson,* Apr. 1894 (ANS). ST. JOHNS: St. Augustine, *Reynolds,*

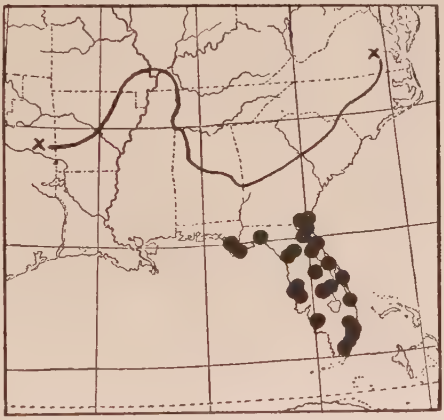
FIG. 26. Range of LOBELIA PALUDOSA.

May 1876 (Del, NB). SARASOTA: Sarasota, *Leeds*, Apr. 1931 (ANS). VOLUSIA: Lake Helen, *Mrs. Deam 1787* (M).

19. L. Nuttalli Roem. & Schult., Syst. Veg. V: 39. 1819. Type Locality: "On the dry margins of sandy swamps, from New Jersey to Carolina." Type Specimen: authentic material of "*L. gracilis*" in the Academy of Natural Sciences of Philadelphia.—Perhaps the "*Rapuntium minimum flore pallide coeruleo: caulibus tenuibus infirmis*" of Gronovius, Fl. Virg. 134. ed. II. 1762. *L. Kalmii* Walter, Fl. Car. 218. 1788. *L. Kalmii*, var. *Caroliniana*, Michaux, Fl. Bor.-Am. II: 153. 1803. *L. gracilis* Nuttall, Gen. N. Am. Pl. II: 77. 1818. not *L. gracilis* Andrews, Bot. Rep. V: 340. 1803, which is an Old World species. *L. Kalmii*, var. *gracilis*, Barton, Fl. N. Am. I: plate 34. 1821.—Stem slender, erect, 20–75 cm. high, sometimes simple, but usually with one–several filiform racemose upright or spreading branches; smooth and green above, usually dark purplish-red and short-puberulent below. Cauline leaves few–20, smooth, rather thin, oblanceolate or ovate below, the upper lanceolate or linear; short-acute, or the lower obtuse; sub-entire in outline, but with shallow callose teeth; an average leaf about six times as long as wide; often 0.5 × 2.5 cm. (rarely 1.1 × 2.5–4.0 cm.). Basal leaves ovate, petiolate, more or less pubescent, to 1.0 × 1.5 cm. Petiole to 1 cm. long. Inflorescence a terminal raceme (in branched individuals a main raceme with several shorter secondary ones, developing later in the season); sometimes plainly secund, loosely few–20 flowered. Pedicels slender, flexuous, more or less upright, smooth or often prickly, 5–11 mm. long in fruit, each with a pair of bracteoles at the base. Flower-bracts equalling the pedicels or short (then 1–2 mm. long), smooth, nearly linear, somewhat denticulate. Calyx in anthesis flattish; often with few–numerous bristly hairs, sometimes smooth; becoming short-hemispheric in fruit, about 3.0 mm. in diameter. Capsule about half inferior. Calyx-lobes smooth, entire, narrow-lanceolate or deltoid, 2.0–3.5 mm. long. Auricles none. Flower 8–11 mm.

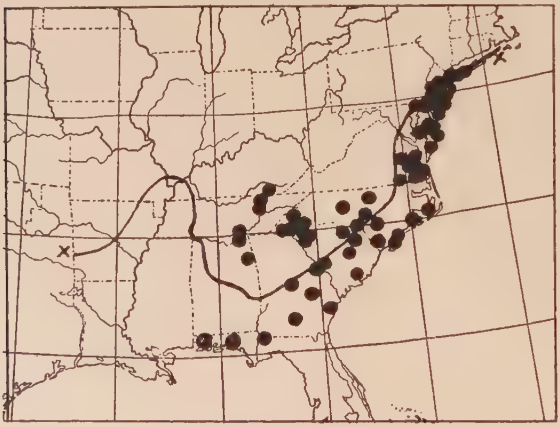

Fig. 27. Range of Lobelia Nuttalli.

long, including calyx. Corolla blue, with a white eye and two greenish tubercles at the base of the lower lip; smooth, or hairy inside the tube. Corolla-tube entire, except for the dorsal fissure; lobes of the lower lip narrow-ovate, shorter than the tube; two upper lobes lanceolate, curved upward. Filament-tube about 3.0 mm. long, pubescent below, connate more than half its length above. Anther-tube about 1.5 mm. long (1.0–1.8 mm.), bluish-gray, the two smaller anthers tufted at the tips, the three larger smooth or pubescent on the backs. Open sandy or grassy swamps, or woods, sometimes in brackish marshes, or dry sandy places; usually in acid situations; central Tennessee and Kentucky to Alabama (Mississippi, acc. to Small), Florida, north to southern Long Island. Appalachian Provinces and Coastal Plain; in Pennsylvania and New York confined to the Coastal Plain and the region south of the moraine. Flower July 1–September 1, from N. J. northward; fruit July 20–October. Southward flowering earlier, beginning May 20. Representative material seen: Kentucky: LAUREL: Sandy Swamps, *Braun*, Oct. 1933 (G); MC CREARY: Pine Knot, *Pennell 13899* (ANS). Tennessee: FRANKLIN: Sewanee, *E. K. Smith*, ann. 1881 (W). MORGAN: Huffmans, *Pennell 13937* (ANS, UP). SCOTT: Winfield, *Pennell 13926* (ANS). Alabama: BALDWIN: Perdido, *Mohr*, Jun. 1890 (US). CHEROKEE: Round Mt., *Leeds*, Jun. 1934 (ANS). CULLMAN: Cullman, *Eggert*, Sep. 1897 (CM, US). ETOWAH: Ballplay, *Mohr*, Jy. 1890 (US). JACKSON: Flat Rock, *Wherry*, Jun. 1933 (ANS, UP). JEFFERSON: DeSoto Falls, *Ruth*, Jy. 1898 (NB, O, US). Florida: GADSDEN: Quincy, *Chapman* (ANS). WALTON: DeFuniak Springs, *Curtiss 5902* (Del, M, NB, NYS, US). Georgia: BALDWIN: "*Dr. Boykin*, Ga.," Torrey herb. (NB). EMANUEL: Graymont, *Harper 814* (NB, US). IRWIN: Ocilla, *Harper 1418* (NB, US). LIBERTY: Sunbury, *L. LeConte* (NB). RICHMOND: Augusta, *Cuthbert*, Jun. 1900 (NB). South Carolina: AIKEN: Aiken, *Ravenel*, Aug. 1866 (NB). ANDERSON: Anderson, *Davis 8214* (US). DARLINGTON: Hartsville, *Norton*, Jy. 1920 (NYS, US). DORCHESTER: Summerville, *Brownfield* (US). GREENVILLE: Reedy River, *J. D. Smith*, Jy. 1881 (US). LANCASTER: Elgin, *House 2571* (US). PICKENS: Table Mt., *Small*, Aug. 1896 (NB). RICHLAND: Columbia, *Taylor* Jun. 1891 (M). SUMTER: Cane Savanna, *Stone 424* (ANS). North Carolina: ANSON: Wadesboro, *Leeds*, Jy. 1929 (ANS). BRUNSWICK: Southport, *Blomquist 5027* (Duke). COLUMBUS: Hallsboro, *Wherry*, Sep. 1934 (UP). CRAVEN: New Bern, *Loomis and Croom* (ANS). CUMBERLAND: Fayetteville, *Biltmore herb. 624k* (NB). DURHAM: *Blomquist 5029* (Duke). HAYWOOD: Waynesville, *Huger* (NB). HENDERSON: Hendersonville, *Biltmore 624a* (NB, US). HYDE: Scranton, *Ashe*, Jun. 1898 (NC). IREDELL: Statesville, *Hyams* (M). JACKSON: Cashiers, *Pennell 14178* (ANS). JOHNSTON: Clayton, *Blomquist 5026* (Duke). MACON: Highlands, *Cuthbert*, Jy. 1897 (NB). MOORE: Pinehurst, *Wicker*, Sep. 1931 (NC). NEW HANOVER: Wilmington, *Coville 71* (US). ORANGE: Chapel Hill, *Totten*, Jun. 1915 (NC). PENDER:

Burgaw, *Hyams*, Aug. 1879 (US). ROWAN: Salisbury, *Heller 106* (ANS, NB). STANLEY: Falls of Yadkin, *Small and Heller*, Aug. 1891 (ANS). TRANSYLVANIA: Cedar Mountain, *Wherry*, Sep. 1934 (UP). VIRGINIA: ACCOMAC: Franklin City, Brown, Sep. 1907 (ANS). ELIZABETH CITY: Hampton, *Steele*, Aug. 1895 (US). GLOUCESTER: Ark, *Leonard and Killip 562* (ANS, US). GREENVILLE: "Belfield," *Heller*, Jun. 1893 (ANS, UP, US). HENRICO: Richmond, *Carter*, Sep. 1894 (ANS). JAMES CITY: Ewell, *Grimes 3901* (NB). NANSEMOND: Suffolk, *Kearney 1576* (US). NORFOLK: *Curtiss*, Jun. 1872 (NB). PRINCE GEORGE: New Bohemia, *Pennell 14425* (ANS). PRINCESS ANNE: Virginia Beach, *Britton et al.*, Jy. 1892 (NB). MARYLAND: HARFORD: Magnolia, *Carter*, Aug. 1904 (ANS). WICOMICO: Sharptown, *J. P. Otis* (?) *C1346* (herb. R.R.T.). WORCESTER: Ocean City, *Canby*, Jy. 1893 (Del). DELAWARE: NEWCASTLE: *Canby*, Aug. 1890 (Del). SUSSEX: Ellendale, *Tatnall 193* (herb. R.R.T.). PENNSYLVANIA: BUCKS: Yardley, *Dreisbach 3260* (ANS). DELAWARE: Tinicum Island, *A. H. Smith*, Jy. 1864 (UP). NEW JERSEY: ATLANTIC: Mays Landing, *Pennell 8117* (ANS). BURLINGTON: Atsion, *Long 6188* (ANS). CAMDEN: Lindenwold, *Long 26393* (ANS); CAPE MAY: Cold Spring, *Stone 13453* (ANS). CUMBERLAND: Dividing Creek, *Long 4808* (ANS). GLOUCESTER: Hardingville, *Long 32545* (ANS). MERCER: Bear Swamp, *Bartram*, Jy. 1913 (ANS). MIDDLESEX: Milltown, *Mackenzie 2803* (US). MONMOUTH: Farmingdale, *Stone 12706* (ANS). OCEAN: Lakehurst, *Long 16613* (ANS). SALEM: Auburn, *Tatnall*, Aug. 1927 (herb. R.R.T.). NEW YORK: NASSAU: Oceanside, *House* Jy. 1916 (NYS). QUEENS: Lawrence Sta., *Bisky*, Aug. 1886 (NB). SUFFOLK: Central Islip, *Ferguson*, Jy. 1920 (NYS).

20. L. FEAYANA Gray, Proc. Am. Acad. Arts Sci. XII: 60. 1877. TYPE LOCALITY: "Eastern and Southern Florida." TYPE SPECIMEN: Material cited by Gray (l. c.) seen in the Gray Herbarium.—Not *L. aphylla* Nuttall, Am. Jour. Sci. V: 297. 1822, which is not a *Lobelia;* see Nuttall in Jour. Acad. Phila. VII: 61–62. 1834. Perhaps *L. microphylla* Rafinesque, Atl. Jour. I: 147. 1832. The latter is described as follows: "Stem simple smooth, leaves minute remote ovate sessile dentate, flowers terminal few and small. Florida and Louisiana."—Stem weak, slender, decumbent or ascending, 5–30 cm. long, simple or diffusely branched, usually near the base; green, rarely purplish below, smooth, sometimes trailing and rooting at nodes. Cauline leaves 1–10, smooth, lanceolate or lance-ovate above, acute, denticulate, about 2.5 × 8.0 mm. Lower leaves broad-ovate or orbicular, 8–13 mm. in diameter, with a definite petiole sometimes 2.0 cm. long; entire or crenate-toothed. Basal leaves similar to the lower cauline ones. Rootstock slender, trailing. Inflorescence a lax terminal raceme 2–18 cm. long (often half the length of the entire plant), more or less secund, bearing 2–15 rather distant flowers upon smooth slender pedicels which are 4–7 mm. long in fruit, each with a pair of inconspicuous bracteoles near the base. Flower-bracts small,

inconspicuous, 1–3 mm. long, acute. Calyx in anthesis conic or short-campanulate, smooth, becoming turbinate in fruit, usually acute at the base, averaging 2.5 mm. in diameter, by about 3.5 mm. high. Capsule ⅔ or more inferior. Calyx-lobes narrowly lanceolate, smooth, entire, 2.0 mm. long. Auricles none. Flower 7–10 mm. long, including calyx. Corolla blue, with a white eye, and two greenish tubercles at the base of the lower lip; smooth, or the tube hairy inside. Corolla-tube entire, except for the dorsal fissure; lobes of the lower lip narrow-ovate, shorter than the tube; two upper lobes lanceolate, curved upward. Filament-tube about 3.0 mm. long, nearly smooth, connate more than half its length above. deflexed. Anther-tube 1.0–1.5 mm. long, bluish-gray, the two smaller anthers tufted at the tips, the three larger smooth or pubescent on the backs. Seeds rough-reticulate, ovate, about 0.5 mm. long.

This species is very close to *L. Nuttalli*, from which it differs by the weaker shorter stems, usually roundish lower leaves, general smoothness, including pedicels and calyx (in contrast to *L. Nuttalli*, which is often prickly), and the more elongate calyx. It is apparently not at all closely related to *L. Cliffortiana* L. and its relatives, as has been supposed by most American authors, but is in a wholly different section of the genus. It is, however, superficially like the plant passing for *L. Xalapensis* HBK. (*L. Cliffortiana* var. *Xalapensis* Gray), which may be distinguished by the *smooth shining seeds*, more upright, coarser leafy stems, longer inflorescence, serrate leaves.—Moist places, ditches, seashores, swamps, often in sandy places and pinelands; peninsular Florida; not seen from extreme southern Florida. Flower January–June, or more or less throughout the year. Representative material seen: FLORIDA: BREVARD: Cape Canaveral, *Curtiss 5831* (Del, M, NB, NYS). CHARLOTTE: Punta Gorda, *Leeds*, Apr. 1931 (ANS). DUVAL: Pablo, *Lighthipe 539* (M, NB, W). GLADES: Palmdale, *Leeds*, Apr. 1931 (ANS). HIGHLANDS: Sebring, Mar. 1935 (UP). HILLSBOROUGH: Tampa, *Churchill*, Mar. 1923 (ANS). INDIAN RIVER: Fellsmere, *Small 8891* (NB). LAKE: Lakeland, *Blanton 6971* (NB). LEE: Coconut, *Moldenke 695* (Duke, NB, UP). MANATEE: Bradentown, *Tracy 7510* (CM, M, UP, W). PINELLAS: St. Petersburg, *Mrs. Deam 5000* (M). ST. LUCIE: Fort Pierce, *Tatnall 864* (ANS). SARASOTA: Osprey, *B. H. Smith*, Mar. 1904 (ANS, CM). SEMINOLE: Sanford, *S.R.*, Apr. 1915 (NB). VOLUSIA: Mosquito Inlet, *Curtiss 1641** (CM, M, NB, UP).

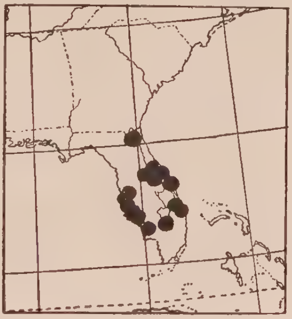
FIG. 28. Range of LOBELIA FEAYANA.

21. L. KALMII Linnaeus, Spec. Pl. II: 930. 1753. TYPE LOCALITY: "Habitat in Canada." TYPE SPECIMEN: in the Linnaean herbarium

in London; collected by Kalm, and seen by Linnaeus before 1753. Photograph seen.—*Rapuntium Canadense, pumilum, Linariae folio Sarrac.*, Tournefort, Inst. R.H. 164. 1719. This is apparently the first mention in literature of this plant. The material was sent to Tournefort by Dr. Michel Sarrazin (1659-ca. 1736), who was at that time a physician in Quebec. *L. falcata* Rafinesque, N. Fl. N. Am. II: 18. 1836. *L. Kalmii* var. *strictiflora* Rydberg, Fl. Montana 378. 1900. TYPE LOCALITY: "Rocky Mountain Region." TYPE SPECIMEN: Teton R., Mont., *Scribner 130* (seen in ANS, Del, O); also Hurricane Hills, Assiniboia, *Macoun*, ann. 1883. The variety is said to differ from the typical form by the erect pedicels and the acute base of the capsules. However, these characters do not hold entirely, even in the type material (*Scribner 130*); moreover, the present writer has seen material from Montana and the mountains of British Columbia which exactly duplicates eastern material. It is thus thought best not to recognize the variety. *L. strictiflora* Lunell, Bull. Leeds Herb. No. 2: 8. Nov. 3, 1908.—Plants extremely variable in vegetative characters. Stems tall, slender, nearly unbranched, 15–35 (60) cm. high, green or reddish below, smooth or slightly pubescent near the base; varying to a diffusely branched form which is often stouter and shorter, and sometimes to a tufted form with stems 2–3 cm. high, forming a rosette-like mat. Cauline leaves 4–15, smooth, thin, subentire or shallowly dentate, with callose teeth; narrowly linear or lance-linear (in the unbranched form), 0.05–0.2 × 0.7–4.0 cm. In the branched or coarser plant; leaves broader, larger, 0.08–0.8 × 0.7–7.0 cm., oblanceolate or broader, even to narrow-ovate, usually obtuse, the lower sometimes narrowed into short petioles. Basal leaves if present few, spatulate or obovate, obtuse, petiolate, somewhat pubescent, often purplish, about 0.5 × 1.5 cm. (Maximum 0.8 × 3.5 cm.). Rootstock slender, sometimes elongate. Main inflorescence a loose terminal raceme, sometimes plainly secund, bearing 1–15 flowers upon long slender roughened pedicels (8–18 mm. long in fruit), each with a pair of conspicuous sub-opposite bracteoles near the middle. Pedicels loose, flexuous or stiffly appressed. Branch-racemes shorter than the central one, and developing later. Flower-bracts linear, smooth, about equalling the pedicel or longer (in the more luxuriant, branched plants). Calyx in anthesis conic or campanulate, smooth, becoming long-oval, oblong, or sub-globose in fruit, varying with age on the same plant (usually rounder when young). Capsule more than ¾ inferior, 3–6 mm. in diameter, by 4–9 mm. long. Calyx-lobes lanceolate or deltoid, 1.5–5.0 mm. long (ave. 2.5–3.5 mm.), smooth. Auricles none. Flower 7–16 mm. long, including calyx (ave. 10–13 mm.). Corolla blue, with a conspicuous white eye, or sometimes all white; smooth, or the tube hairy inside, the lower lip smooth. Corolla-tube entire, except for the dorsal fissure; lobes of the lower lip ovate, apiculate, equalling or exceeding the tube; two upper lobes lanceolate, curved upward. Filament-tube 2.5–3.5 mm. long, smooth, connate above more than half its length. Anther-tube 1.6–1.8 (2.0) mm. long, bluish-gray, the two smaller anthers tufted, the three larger smooth or pubescent on the backs. Seeds long-fusiform, acute at both ends, 0.6–0.8 mm. long.

The diversity of form shown by this plant seems to be related to changes in habitat; it is a plant of calcareous situations, in general, and the slender, unbranched form is characteristic of grassy or marly bogs, while the coarser or more luxuriant form is known more from limy beaches or cliffs. All efforts to separate them by good characters, independent of habitat, have failed.—Wet meadows and bogs, in neutral or calcareous situations; shale or limestone beaches or cliffs; sometimes in sandy bogs; almost always in wet places. Newfoundland to western Massachusetts and south to the moraine in Pennsylvania (also Lancaster Co.); west to Ohio, Minnesota, and Colorado, north to Hudson Bay, Montana, British Columbia and Great Slave Lake. Absent from large regions of prevailingly acid soil. Flower July 1–September 1. Fruit July 20–September 20. So characteristic that it is unnecessary to cite the abundant material seen, except for the following outlying stations. PENNSYLVANIA: LANCASTER: Dillerville Swamp, *Heller*, Sept. 1901 (CCD, CU, W). ONTARIO: COCHRANE: James Bay, mouth of Albany River, *Spreadborough*, herb. G. S. Can 62542(O). MACKENZIE: sandy muskeag, N. arm, Great Slave Lake, *G. S. Hume*, Jy 31, 1920(O). COLORADO: LARIMER: Fort Collins, *Baker*, Aug. 1896 (CM).

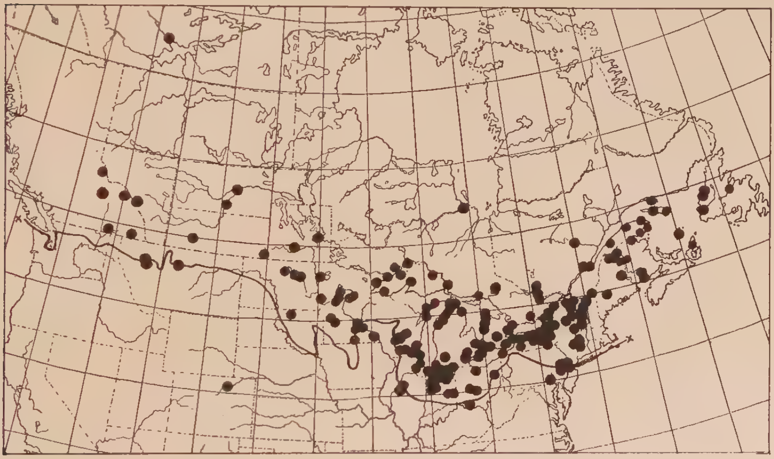

FIG. 29. Range of LOBELIA KALMII.

22. L. DORTMANNA Linnaeus, Spec. Pl. II: 929. 1753. TYPE LOCALITY: "Habitat in Europae frigidissimae lacubus & ripis."

TYPE SPECIMEN: in Linnaean Herbarium in London; seen by Linnaeus before 1753. Photograph seen.—*Gladiolus lacustris Dortmanni,* Clusius, "Curae posteriores," 40. 1611. *Leucoium palustre flore subcaeruleo,* Bauhin, "Pinax," 202. 1623. *Dortmanna lacustris floribus sparsis pendulis,* Rudbeck, Act. ups. 1720. p. 97. t. 2 (according to Linnaeus). *L. foliis bilocularibus subulatis,* Linnaeus, Fl. lapp. 227. 1737.—Aquatic; smooth throughout. Stem upright, unbranched (rarely with 1–2 branches), 5–100 cm. high (ave. 30–35 cm.), usually immersed about ⅔ of its height (all except the inflorescence); green above water, and green to stramineous below, leafless, bearing 0–7 linear fleshy bracts 1–7 mm. long; stem hollow. Leaves basal (rarely developing 1–3 cauline leaves 2–4 cm. long), linear, entire, fleshy, in number 2–27 (ave. 15–20), 2.0–5.0 (8.0) cm. long by 1.0–4.0 mm. wide, when flattened out; obtuse or short-acute. Inflorescence a lax terminal raceme to 45 cm. long (ave. 10–20 cm.), often more or less secund, very loosely 1–11 flowered (ave. 5–6). Pedicels in fruit 4–13 mm. long (ave. about 7.0 mm.), curved, elongating in fruit and curving further, so that the flower is often horizontal, while the fruit is pendent. Bracteoles of pedicel none. Flower-bracts obtuse, fleshy, entire, 2–3 mm. long, with a broad base. Calyx in anthesis conic or long-triangular, becoming long-cylindric, barrel-shaped or obconic in fruit, usually with a long-attenuate base, in size 4–5 × 6–12 mm. Capsule ¾ or more inferior. Calyx-lobes short-lanceolate or deltoid, blunt, 1.5–2.5 mm. long. Auricles none. Flower 12–22 mm. long, including calyx (N.B. In this species the length of the flower is very variable, with the youngest flowers of a well-developed inflorescence often appearing the smallest. This tendency is seen throughout the group, but not so strikingly as in *L. Dortmanna.*). Corolla pale violet-blue to white, pubescent at the base of the lower lip, otherwise smooth. Corolla-tube entire except for the dorsal fissure, which may extend only to within 1–2 mm. of the base. Lobes of the lower lip long-ovate, nearly equalling the tube,

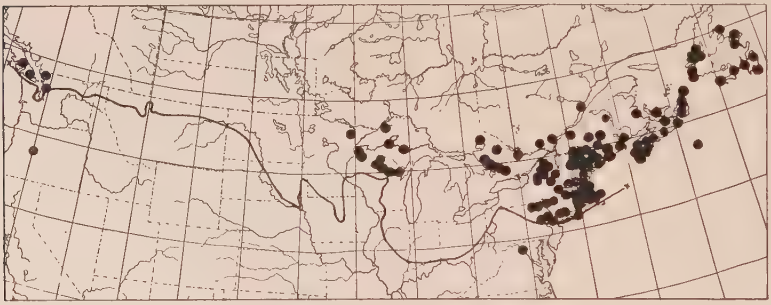

FIG. 30. American Range of LOBELIA DORTMANNA.

not sharply reflexed; two upper lobes linear, curved upward. Filament-tube 4–6 mm. long (ave. about 4.5), pubescent below, connate most of its length above. Anther-tube 1.3–1.7 mm. long, dark gray or black, the two smaller anthers heavily tufted, the three larger densely bearded, especially near the tip. Seeds dark brown, with a prominent square base at one end.—Sandy or gravelly borders of ponds, usually partly immersed; more rarely in mud or in quiet streams; Newfoundland and central Ontario to northern Pennsylvania, west to northern Minnesota; also in Oregon, Washington and British Columbia; Slave Lake, *Richardson* (Hooker, Fl. Bor.-Am.). Apparently identical with the plant of northwestern Europe. Flower July 1–September 1. Fruit July 15–September 15. So distinct that it is unnecessary to cite the specimens seen, except from the following outlying localities. WEST VIRGINIA: A specimen in the Detwiller herbarium in the Academy of Natural Sciences of Philadelphia is labelled: "nr. Harpers Ferry, Virg. Aug. 14, 1846." The Detwiller herbarium is mostly from near Mercersburg, Pa., and it is possible that the above collection is from Pennsylvania or even further north. OREGON: JEFFERSON: Cascade Mts., Dark Lake, *Sweetser*, Aug. 1926 (ANS).

EXPLANATION OF ABBREVIATIONS FOR HERBARIA

Ab = University of Michigan, Ann Arbor, Mich.; ANS = Academy of Natural Sciences, Philadelphia, Penna.; CCD = Herbarium of Chas. C. Deam, Bluffton, Indiana; CM = Carnegie Museum, Pittsburgh, Penna.; CU = Cornell University, Ithaca, New York; Del = Delaware Society of Natural History, Wilmington, Del.; Duke = Duke University, Durham, N. C.; G = Gray Herbarium, Harvard University, Cambridge, Mass.; herb. R.R.T. = Herbarium of R. R. Tatnall, 1100 W. 10th St., Wilmington, Del.; M = University of Minnesota, Minneapolis, Minn.; Miss = Mississippi State College, State College, Miss.; Mo = Missouri Botanical Garden, St. Louis, Mo.; NB = New York Botanical Garden, Bronx Park, N. Y.; NC = University of North Carolina, Chapel Hill, N. C.; NE = New England Botanical Club, Gray Herbarium, Harvard Univ.; NYS = Herbarium of New York State Museum, Albany, N. Y.; O = National Museum of Canada, Ottawa, Ont.; Pa = Pennsylvania State Herbarium, Harrisburg, Penna.; R = Rocky Mountain Herbarium, Univ. of Wyoming, Laramie, Wyo.; Toronto = Toronto University, Toronto, Ont.; UGa = University of Georgia, Athens, Ga.; UP = University of Pennsylvania, Philadelphia, Penna.; US = U. S. National Museum, Smithsonian Institution, Washington, D. C., W = University of Wisconsin, Madison, Wis.; WVa = West Virginia University, Morgantown, W. Va.

EXPLANATION OF PLATE 435

FIG. 1, L. CLIFFORTIANA L. (possibly *L. xalapensis* HBK.); FIG. 2, L. FEAYANA Gray; FIG. 3, L. NUTTALLI R. & S. (one seed of *L. Cliffortiana* L. may be seen near the top of the picture); FIG. 4, L. GATTINGERI Gray; FIG. 5, L. CANBYI Gray: FIG. 6, L. SPICATA Lam., var. ORIGINALIS McVaugh; FIG. 7, L. SPICATA Lam., var. CAMPANULATA McVaugh; FIG. 8, L. PUBERULA Mx.; FIG. 9, L. KALMII L.; FIG. 10, L. GLANDULOSA Walt.; FIG. 11, L. FLORIDANA Chapm.; FIG. 12, L. INFLATA L.; FIG. 13, L. DORTMANNA L.; FIG. 14, L. AMOENA Mx.; FIG. 15, L. SIPHILITICA L.; FIG. 16, L. CARDINALIS L.

The seeds photographed were from the following specimens:

FIG. 1, Brooksville, Hernando Co., Fla., *Leeds*, Apr. 1931 (ANS); FIG. 2, *Mrs. Deam 5000* (M); FIG. 3, Wadesboro, Anson Co., N. C., *Leeds*, Jy. 1929 (ANS); FIG. 4, "cedar barrens," Jun. 1879, *Gattinger* (Mo); FIG. 5, Ellendale, Sussex Co., Del., *Commons*, Sep. 1895 (ANS); FIG. 6, Madalin, Dutchess Co., N. Y., *McVaugh 2674* (UP); FIG. 7, *House 20543* (NYS); FIG. 8, *Deam 35293* (ANS); FIG. 9, *Ehlers 1313* (ANS); FIG. 10, Miami, Dade Co., Fla., *Meredith*, Mar. 17, 1917 (ANS); FIG. 11, *Pennell 4186* (UP); FIG. 12, *Strausbaugh 309* (WVa); FIG. 13, Greenfield, Hillsboro Co., N. H., *Batchelder*, Aug. 14, 1911 (ANS); FIG. 14, *Biltmore herb. 622c* (UP); FIG. 15, *House 19001* (NYS); FIG. 16, *House 18994* (NYS).

The photographs of seed were all taken with the aid of a Bausch and Lomb 48 mm. microtessar lens. The magnification is approximately 12x.

EXPLANATION OF TEXT FIGURES

The lines showing the glacial moraines are taken from Antevs (*2*), and the position of the Fall Line is essentially that shown by Fenneman (*16*). A few records on the maps are indicated by circles rather than solid dots; these are doubtful either as to exact locality or as to exact identity of the plant in question.

LITERATURE CITED

1. ANDREWS, H. C. Botanist's Repository. **5:** plate 340. 1803.
2. ANTEVS, E. Bull. Geol. Soc. Amer. **40:** 631–720. Dec. 31, 1929.
3. BARTON, W. P. C. Flora of North America. **1:** Philadelphia, 1821.
4. BAUHIN, C. Pinax theatri botanici. 110. Basiliae, 1623.
5. BENTHAM, G. Notes on the Gamopetalous Orders belonging to the Campanulaceous and Oleaceous Groups. Journ. Linn. Soc., Bot. **15:** 1–16. Oct. 11, 1875.
6. BENTHAM, G., and HOOKER, J. D. Genera Plantarum. **2:** part 2. 541–564. London, 1876.
7. BUSH, B. F. Some new Texas Plants. Ann. Rep. Mo. Bot. Garden **17:** 122. 1906.
8. CHAPMAN, A. W. An Enumeration of some Plants—chiefly from the semi-tropical regions of Florida. Bot. Gaz. **3:** no. 2. 9. Feb. 1878.
9. ————. Flora of the Southern United States. 276. Ed. 3, Cambridge, Mass., 1897.
10. CLUSIUS, C. Curae posteriores seu plurimarum non ante cognitarum aut descriptarum stirpium. 40. Antwerp, 1611.
11. COLEMAN, A. P. The Pleistocene of Newfoundland. Journ. Geol. **34:** 193–223. 1926.
12. DE CANDOLLE, A. Prodromus systematis naturalis regni vegetabilis. **7:** sectio posterior. 339–413. Paris, 1839.
13. DELPINO, F. Studi sopra un lignaggio anemofilo delle Composte. Firenze, 1871.
14. DODART, D. Memoires pour servir à l'histoire des plantes. Paris, 1676.
15. ELLIOTT, S. A Sketch of the Botany of South Carolina and Georgia. 2 vols. Charleston, 1821–1824.
16. FENNEMAN, N. M. Physiographic Divisions of the United States. Annals Asso. Am. Geographers **6:** 19–98. 1917.
17. FERNALD, M. L. Persistence of Plants in Unglaciated Areas of boreal America. Mem. Am. Acad. Arts Sci. **15:** no. 3. 241–342. 1925.
18. GRAY, A. Manual of the Botany of the Northern United States. Ed. 5. New York, 1867.
19. ————. Contributions to the Botany of North America. Proc. Am. Acad. Arts Sci. **12:** 60. 1877.
20. ————. Synoptical Flora of North America. **2:** part 1. Ed. 1, New York, May 1878.
21. ————. Contributions to North American Botany. Proc. Am. Acad. Arts Sci. **17:** 221. 1882.

22. ————. Synoptical Flora of North America. **2:** part 1. Suppl. 394. Ed. 2, New York, January 1886.
23. Greene, E. L. New or noteworthy Species XXIII. Pittonia **3:** 349. Washington, D. C. Sep. 27, 1898.
24. Gronovius, J. F. Flora Virginica. Lugd. Bat., 1739. 134–135. Ed. 2, Lugd. Bat., 1762.
25. Hayne, F. G. Getreue Darstellung und Beschreibung der in der Arzneykunde gebraüchlichen Gewächse. **13:** plate 9. Berlin, 1837.
26. Hegi, G. Illustrierte Flora von Mittel-Europa. **6:** part 1. 394. Munchen, 1915.
27. Hernandez, F. Rerum medicarum Novae Hispaniae thesaurus. p. 879, and fig., p. 880. Rome, 1651.
28. Hitchcock, A. S., and Standley, P. C. Flora of the District of Columbia and Vicinity. Contr. U. S. Nat. Herb. **21:** 1919.
29. Hooker, W. J. Curtis's Botanical Magazine **61:** pl. 3292. London, 1834.
30. ————. Flora Boreali-Americana. **2:** 30. London, 1840.
31. Hooker, J. D., and Jackson, B. D. Index Kewensis. **3:** 102. Oxford, 1894.
32. Kalm, P. Lobelia, Såsom en säker läkedom emot Veneriska sjukan, uptäkt af Pehr Kalm. Kongl. Svenska Vetenskaps Acad. Handl. **11:** 280–290. 1750.
33. Kearney, T. H. Report on a Botanical Survey of the Dismal Swamp Region. Contr. U. S. Nat. Herb. **5:** no. 6. 542. Nov. 6, 1901.
34. Lamarck, J. B. Monet de. Dictionnaire encyclopédique de botanique. **3:** Paris, 1789.
35. Linnaeus, C. Systema Naturae. Ed. 1. Lugd. Bat., 1735.
36. ————. Fundamenta botanica. Amsterdam, 1736.
37. ————. Flora Lapponica. Amsterdam, 1737.
38. ————. Genera Plantarum. Ed. 1. Lugd. Bat., 1737.
39. ————. Hortus Cliffortianus. 426, 500. Amsterdam, 1737.
40. ————. Species Plantarum. 2 vols. Holmiae, 1753.
41. ————. Genera Plantarum. 401. Ed. 5. Holmiae, 1754.
42. Lunell, J. Bulletin of the Leeds Herbarium. no. **2:** 8. Nov. 3, 1908.
43. Mackenzie, K. K., Bush, B. F., and others. Manual of the Flora of Jackson County, Missouri. Kansas City, Mo., 1902.
44. Michaux, A. Flora Boreali-Americana. 2 vols. Parisiis et Argentorati, 1803.
45. Mohr, C. Plant Life of Alabama. Contr. U. S. Nat. Herb. **6:** 749. Jy. 31, 1901.
46. Morison, R. Plantarum historiae universalis oxoniensis. **1:** Oxford, 1680.
47. Muhlenberg, H. Catalogus Plantarum Americae septentrionalis. Lancaster, Pa., 1813.
48. Nuttall, T. The Genera of North American Plants. 2 vols. Philadelphia, 1818.
49. ————. A Catalogue of a Collection of Plants made in east Florida, during the months of October and November, 1821. Am. Journ. Sci. Arts **5:** 297. 1822.
50. ————. A Description of some of the rarer or little known Plants indigenous to the United States. Journ. Acad. Phila. **7:** 61–62. 1834.
51. Parkinson, J. Paradisus terrestris. 356. London, 1629.
52. Petersen, N. F. Flora of Nebraska. 173. Plainview, Neb., 1923.
53. Plukenet, L. Almagestum botanicum. 170, 316. London, 1696.
54. Plumier, C. Nova plantarum Americanarum genera. 21. Paris, 1703.
55. Presl, C. B. Prodromus monographiae Lobeliacearum. Pragae, 1836.
56. Pursh, F. Flora Americae septentrionalis. 2 vols. London, 1814.
57. Rafinesque, C. S. Annals of Nature. **1:** Lexington, Ky., 1820. Reprint by T. J. Fitzpatrick, Iowa City, Ia., Jan. 15, 1908.

58. ————. Atlantic Journal and Friend of Knowledge. **1:** no. 4. Philadelphia, winter of 1832.
59. ————. New Flora and Botany of North America. Part **2:** Neophyton. Philadelphia, 1836.
60. Ray, J. Historia plantarum. **1:** 731–747. London, 1686.
61. ————. l. c., **2:** 1325. London, 1688.
62. Rivinus, A. Q. Introductio generalis in rem herbarium. Lipsiae, 1690.
63. Rock, J. F. A monographic Study of the Hawaiian Species of the Tribe Lobelioideae, Family Campanulaceae. Mem. Bernice P. Bishop Mus. **7:** no. 2. Honolulu, 1919.
64. Roemer, J. J., and Schultes, J. A. Systema vegetabilium. **5:** 39. Stuttgardtiae, 1819.
65. Rudbeck, O. Act. Ups. 1720. p. 97. t. 2. (according to Linnaeus, Spec. Pl. **2:** 929. 1753). This is apparently the following: *Acta literaria* (*et scientiarum*) *Sveciae* of the Kongliga Vetenskaps-Societeten, Upsala.
66. Rupp, H. B. Flora Jenensis. Francofurti & Lipsiae, 1718.
67. Rydberg, P. A. Catalogue of the Flora of Montana. New York, 1900.
68. Small, James. The Origin and Development of the Compositae. London, 1919. Reprint from New Phytologist vols. 16–18, 1917–1919.
69. Small, John K. Studies in the Botany of the Southeastern United States. Bull. Torr. Bot. Club **24:** no. 7. 338. 1897.
70. ————. Flora of the Southeastern United States. New York, 1903.
71. ————. Manual of the Southeastern Flora. 1293. New York, 1933.
72. Tournefort, J. P. de. Institutiones rei herbariae. 3 vols. Paris, 1700.
73. ————. l. c., **1:** 163. Paris, 1719.
74. Walter, T. Flora Caroliniana. London, 1788.
75. Willdenow, K. L. Hortus Berolinensis. **1:** Berlin, 1806.
76. ————. l. c., **8:** plates 85, 86. Berlin, 1809. Plate 85 is to accompany the original description of *L. fulgens;* plate 86 is to accompany that of *L. splendens.*
77. Wimmer, F. E. Studien zu einer Monographie der Lobelioideen. Fedd. Rep. Spec. Nov. **26:** 3–4. 1929.
78. Wood, A. Class Book of Botany. New York, 1861.

NOTES ON THE FLORA OF MICHIGAN—I[1]

Frederick J. Hermann

The records for the species here reported are based upon collections of either Mr. C. R. Hanes, of Schoolcraft, Michigan, or of the writer. Both Mr. Hanes' collections and the writer's are represented in the Herbarium of the University of Michigan, and duplicates of most of the writer's specimens have also been rather widely distributed among the larger herbaria of the eastern states. Determinations for Mr. Hanes' grasses have been verified by either Professor Hitchcock or Mrs. Chase, and for the confirmation of his other reported species the writer assumes the responsibility. Unless otherwise indicated, the report for each species represents the first record for Michigan so far as could be determined. The grass species prefixed by an asterisk are ascribed to Michigan in Hitchcock's *Manual of the Grasses of the United States* but without indication of locality, and their occurrence in Michigan is not represented on the distribution maps.

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[1] Paper from the Department of Botany and Herbarium of the University of Michigan, No. 576.

*GLYCERIA ACUTIFLORA Torr. Kalamazoo Co.: Schoolcraft Twp., June 3, 1934, *C. R. Hanes.*

The nearest known stations for this species are in southern Ohio and southern Indiana.

MUHLENBERGIA SYLVATICA Torr., f. ATTENUATA (Scribn.) Palmer & Steyermark. Kalamazoo Co.: swamp, Prairie Ronde Twp., September 7, 1934, *C. R. Hanes.*

*SPOROBOLUS ASPER (Michx.) Kunth. Kalamazoo Co.: along Grand Trunk Railway, Schoolcraft Twp., December, 1933, and Pavilon Twp., September, 1935, *C. R. Hanes.*

No doubt introduced. Recently reported also for Berrien County.[1]

ARISTIDA DICHOTOMA Mich.. Kalamazoo Co.: sterile, sandy soil, Charleston Twp., September 22, 1935, *C. R. Hanes.*

*ARISTIDA BASIRAMEA Engelm. Kalamazoo Co.: sterile, sandy soil, Schoolcraft Twp., August 22, 1934, *C. R. Hanes.*

LEPTOLOMA COGNATUM (Schult.) Chase. Kalamazoo Co.: common in sandy soil, Schoolcraft Twp., August 27, 1933, *C. R. Hanes.*

Reported by Hebert[2] for Berrien County and determination of specimen verified by C. C. Deam.

SCIRPUS DEBILIS Pursh, var. WILLIAMSII Fernald. Kalamazoo Co.: sandy soil, Eagle Lake, Texas Twp., August 26, 1935, *C. R. Hanes.*

Previously known, apparently, only from Massachusetts.

SCIRPUS SMITHII Gray, var. SETOSUS Fernald. Kalamazoo Co.: sandy shore of West Lake, Portage Twp., July 31, 1935, *C. R. Hanes.*

CAREX VULPINOIDEA Michx., var. **pycnocephala**, var. nov., humilis, dense caespitosa; foliis angustis, rigidis; perigynio anguste lanceolato, gradatim in rostrum contracto, marginibus tenuibus haud cortice incrassatis.—Apparently confined to the Great Lakes region. MICHIGAN: sandy shore of Big Stone Bay, Lake Michigan, 3½ miles west of Cecil Bay, Emmet County, August 14, 1934, *F. J. Hermann,* no. 6408 (TYPE in Herbarium of F. J. Hermann); beach of Lake Huron, Mackinac Island, July 28, 1935, *H. A. Gleason, Jr.* INDIANA: Steuben County, June 17, 1903, *C. C. Deam.* MINNESOTA: bog near Twin Ponds, Hubbard County, July 13, 1933, *J. B. Moyle,* no. 820.

From typical *Carex vulpinoidea* this variety differs in its narrowly lanceolate, very gradually beaked perigynia which are thin-edged and not at all corky-margined. In these characteristics it resembles *C. vulpinoidea* var. *setacea* (Dewey) Kükenthal, as interpreted by Bicknell[1] under *C. setacea* Dewey, from which it is readily distinguished by its low, densely cespitose habit, its narrow, rigid leaves, its short, broad and very congested inflorescence and its almost obsolete perigynium teeth.

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[1] Hebert, Am. Midl. Nat. **15**: 325. 1934.

[2] Ibid. 324.

Xyris caroliniana Walt. Kalamazoo Co.: West Lake, Portage Twp., August 23, 1934, *C. R. Hanes.*

Juncus militaris Bigel. Presque Isle Co.: mucky, drying bed of Lake Sixteen (Sect. 16, Twp. 36 N., R. 2 E.), Black Lake State Forest, 8 miles west of Hammond, August 12, 1935, *E. L. Miner*, no. 1562; August 27, 1935, *F. J. Hermann*, no. 7015 and September 13, 1935, *F. J. Hermann*, no. 7317.

Dr. E. L. Miner of Weber College, Ogden, Utah, recently turned over to the writer for determination a set of Junci which he had collected in the Douglas Lake region and among them was this species of the Atlantic slope. The most westerly stations previously known for this rush are in Oneida and St. Lawrence Counties, New York, so that the Michigan record represents a range extension of approximately 500 miles. A trip was made to Lake Sixteen by the writer two weeks after Dr. Miner's discovery of *Juncus militaris* and it was found to cover many acres of the drying, mucky lake bed near the northeastern shore. About one-fourth of the colony was forma *subnudus* Fernald.[2]

Lake Sixteen is situated on the sandy bed of former Lake Algonquin. It is bounded on the south by steep, sandy moraines covered with aspen and white pine, and on the east, north and west by plains where the forest is a mixture of aspen, white and jack pine, red maple, red oak and canoe birch.

The only plant growing with *Juncus militaris* at this station is *Scirpus acutus*, but toward the shore its associates are largely either coastal plain species or species having their nearest allies in others of that floristic element, such as *Solidago hirtella* Greene which apparently has been derived from the coastal *S. graminifolia* var. *Nuttallii*. The sandy and peaty margin of the lake is occupied by *Juncus pelocarpus*, *Eriocaulon septangulare*, *Viola lanceolata* and *Hypericum ellipticum*. This peaty zone extends shoreward for about fifty feet and is succeeded by a sandy beach where the following additional species come in: *Muhlenbergia uniflora, Drosera intermedia, Panicum meridionale* var. *albemarlense, Utricularia cornuta, Solidago hirtella* and *Bartonia virginica.*

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[1] Bicknell, Bull. Torr. Bot. Club 23: 24. 1896.

[2] Fernald, Rhodora 24: 166. 1922.

The presence of *Juncus militaris* in Michigan near the northwestern end of Lake Huron is further evidence corroborating the hypothesis of a former migratory route for coastal plain species along the shore of the glacial lakes and their Hudson Valley outlet to the Hudson-Champlain Estuary.

JUNCUS EFFUSUS L., var. COMPACTUS Hoppe. Alger Co.: sandy border of black spruce bog, West Branch of Manistique Creek, 6 miles east of Shingleton, August 14, 1934, *F. J. Hermann,* no. 6394.

This is the first Michigan record for this eastern and European variety. Fernald and Wiegand[1] cite specimens ranging from Newfoundland southward along the coast to Massachusetts.

JUNCUS EFFUSUS L., var. DECIPIENS Buchenau. Chippewa Co.: wet, rocky shore of Sugar Island, 1½ miles northwest of Homestead, September 2, 1935, *F. J. Hermann,* nos. 7122 and 7136.

The westernmost stations cited by Fernald and Wiegand[2] for this variety of the Northeast and of eastern Asia are Plevna and Algonquin Park, Ontario. At Sugar Island it was found to be locally plentiful along the rocky and sandy shores of Lake George. Another station at Haviland Bay on Lake Superior, Sault Ste. Marie District, Ontario (*F. J. Hermann,* nos. 7281 and 7291), may be noted here as being slightly farther west than the Sugar Island locality.

PILEA FONTANA (Lunell) Rydb. Washtenaw Co.: open marshy bank of Huron River, 2 miles east of Ann Arbor, August 24, and September 22, 1935, *F. J. Hermann,* nos. 7003 (in flower) and 7341 (in fruit).

Reported from North Dakota, Nebraska and Indiana.[3]

P. fontana seems to be a plant of open marshy or boggy situations, while the usual habitat of *P. pumila* is moist, shaded woods. At the Ann Arbor station it densely carpets the marshy river's edge for several hundred yards and has much the aspect of a bed of seedlings, the fruiting plants averaging six inches in height, although occasional individuals are fully as large as *P. pumila.* It is here associated with *Pedicularis lanceolata, Agrostis perennans, Juncus effusus* var. *Pylaei,*

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[1] Fernald and Wiegand, RHODORA **12:** 85. 1910.

[2] Loc. cit. 87.

[3] See also Fernald, RHODORA **38:** 169–170. 1936.

Scirpus validus, Equisetum palustre, Lobelia siphilitica, Juncus Dudleyi, Eupatorium perfoliatum, Gentiana Andrewsii, Carex Pseudo-Cyperus, C. Bebbii, Scirpus atrovirens, Bidens trichocarpa, Aster puniceus and *Carex hystricina.*

Lepidium perfoliatum L. Kalamazoo Co.: alfalfa field, Schoolcraft Twp., May 26, 1935, *C. R. Hanes.* Doubtless introduced. Reported for Washtenaw County by Walpole.[1]

Lechea Leggettii Britt. & Hollick. Kalamazoo Co.: sand dunes, Austin Lake, Portage Twp., October 10, 1934, *C. R. Hanes.*

Hydrocotyle americana L. Chippewa Co.: abundant on wet, mossy floor of balsam-arbor-vitae-birch woods, ½ mile south of Homestead, Sugar Island, September 5, 1935, *F. J. Hermann,* no. 7199.

The only record of this species for the Upper Peninsula is that reported by Kenoyer[2] as "Chippewa Co., Lewis Foote, 1867."

Myosotis micrantha Pallas. Washtenaw Co.: gravelly roadside, 1½ miles south of Portage Lake, May 20, 1935, *F. J. Hermann,* no. 6485; waste ground, U. of M. Botanical Gardens, May 25, 1935, *F. J. Hermann,* no. 6508.

Apparently of recent introduction in Michigan. It is abundant at both the above localities. The American range of this weedy exotic is usually given as "Mass. to Ont. and O.," but according to Schaffner[3] the Ohio report is unauthenticated.

Salvia lanceifolia Poir. Kalamazoo Co.: field near hog yard, Schoolcraft Twp., August 21, 1935, *C. R. Hanes.* Probably introduced with grain.

Gerardia Gattingeri Small. Kalamazoo Co.: edge of marsh, Schoolcraft Twp., August 30, 1935, *C. R. Hanes.* Reported for Oakland County by Pennell.[4]

Liatris punctata Hook. Kalamazoo Co.: a single plant on roadside near prairie, Schoolcraft Twp., August 16, 1933, *C. R. Hanes.*

Boltonia asteroides (L.) L' Hér. Monroe Co.: wet, sandy shore of sluggish creek 5 miles southeast of Erie, August 10, 1935, *F. J. Hermann,* no. 6929.

Not previously recorded from the Michigan shore of Lake Erie. It is plentiful at this locality near the Ohio state line and was also found to be abundant on the Lake Erie shore two miles east of Erie but at this date was not yet in flower at the latter station. Beal, in *Additions to the Michigan Flora,*[5] gives Van Buren County, *H. S.*

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[1] Walpole, Flora of Washtenaw County, Michigan. 1924.

[2] Kenoyer, Papers Mich. Acad. Sci. **3**: 154. 1923.

[3] Schaffner, Ohio Biol. Surv. Bull. **25**: 183. 1932.

[4] Pennell, Proc. Acad. Nat. Sci. Phila. **81**: 216. 1929.

[5] Beal, Tenth Ann. Report Mich. Acad. Sci. 85. 1909.

Pepoon, as the only Michigan report for this species which is generally considered a member of the coastal plain flora.

Helenium nudiflorum Nutt. Kalamazoo Co.: moist soil southwest of Camp Custer, August 20, 1935, *H. R. Becker*.

Chondrilla juncea L. Kalamazoo Co.: sandy soil, Portage Twp., August 8, 1934, *C. R. Hanes*.

Lactuca saligna L. Washtenaw Co.: dry, sterile bank of Huron River, Shanghai Pit, 3 miles northwest of Ypsilanti, August 4 and 15, 1935, *F. J. Hermann*, nos. 6922 and 6972.

This European weed, although known from Ohio for several decades, seems only lately to be spreading rapidly, as the Indiana, Missouri and California reports are recent and the writer has not succeeded in finding other Michigan records. The flowers in the Washtenaw County colony were deep blue instead of the yellow prevalent in § *Scariola;* but since they were partly wilted when found, this color may have been due to oxidation. Reports by others who have observed the plant in the field are not in agreement upon the flower color.

University of Michigan.

A NOTE ON SPECIES DIFFERENTIATION IN ANTENNARIA

G. Ledyard Stebbins, Jr.

In a recent publication (Rhodora **38**: 231. 1936) Dr. Fernald has ascribed to me the principle that, "we are to distinguish as species the bisexual and parthenogenetic series which show no other appreciable differences." In answer to this contention, I wish to reply that I have never held to this or any similar principle, and that no mention has ever been made of it in any of my publications. Furthermore, two papers now in manuscript or in preparation which discuss bisexual and parthenogenetic races in species of *Crepis* and *Youngia* will demonstrate even more clearly that no such principle is held. In the case of *Antennaria*, which was the subject of Fernald's discussion, I have long been aware that in some species, e.g. *A. Parlinii* and *A. fallax*, both bisexual and parthenogenetic races exist, just as they do in the species of *Crepis* and *Youngia* which are the subject of these forthcoming papers, and it is for this reason that in my discussion of the differences between *A. virginica* and *A. neodioica*

(RHODORA **37**: 231–233), no mention was made of this difference. The validity of *A. virginica* was judged chiefly on the basis of the width of the cauline leaves and involucral bracts, the character of the inflorescence, the length of the corollas, the frequent presence of flat scarious tips on the upper cauline leaves in typical *A. virginica,* and the pitting of the receptacle. All of these are characteristics used by Fernald as the major differences between *A. rupicola* and *A. neodioica* (RHODORA **35**: 330); between *A. gaspensis* and its relatives and the group of *A. neodioica* (l. c. 329), and in many other cases (cf. Wiegand & Eames, The Flora of the Cayuga Lake Basin. 408–410. 1924). Nevertheless, in his reduction of *A. virginica* to a variety of *A. neodioica,* Fernald makes no discussion of these characteristics, but relies only on the overlapping in the size of the rosette leaves, a character not even mentioned by me as a significant difference between the two species, and the height of the involucres, considered by me (RHODORA **37**: 231) as "somewhat smaller" in *A. virginica* than in *A. neodioica,* and hence a character of only secondary importance. Fernald's negation of this character is undoubtedly justified, on account of the errors made by me in my statement of the measurements, although in both cases the figures of wider scope (*i.e.* 4.5–6.5 mm for *A. virginica* and 5–7 mm for var. *argillicola*) are those based on the final series of specimens examined, and those intended. His statement, however, that, "it is easy to find plants of [*A. neodioica*] var. *attenuata* with involucres 5.5–7 mm high" (*l. c.*) is surprising in view of the fact that in 1933 he himself characterized the involucres of this species and its relatives as "(6–) 7–10 mm high" (RHODORA **35**: 329, under "b" in key), and contrasted with this (*l. c.* 328, under "b") the involucres of certain Newfoundland species as "if pale, at most 7 mm high." The only other differences used under this heading of the key were those of stature and of leaf size, shape, and tomentum, none of which can be considered of major importance, and in some of which (stature, width of basal leaves, reduction of the terminal mucro on the basal leaves) these Newfoundland species are approached or even equalled by forms of *A. virginica.* When writing my discussion of *A. virginica* and *A. neodioica,* I had this paper of Dr. Fernald's before me, and relied in part on the accuracy of the measurements given in it, since I felt that they had been based on his customary careful examination of a large series of specimens. The involucres of *A. neodioica* less than 7 mm high were found at that time to belong either to immature or abortive specimens, or to plants judged by me to be var. *typica* rather than var. *attenuata*, and are included (RHODORA **37**: 234) in my table under the former variety.

I recognize that there is overlapping between *A. virginica* and *A. neodioica* in some characteristics, but since I am aware of an equal amount of overlapping between *A. fallax* and *A. Parlinii* (particularly in the southern and western portions of their range), *A. neglecta* and *A. petaloidea* (chiefly in Wisconsin), *A. petaloidea* and *A. neodioica* (throughout the north central states), and *A. Parlinii* and *A. Brainerdii* (in central New York) I feel that, in the interests of consistency, the reduction of *A. virginica* to a variety calls for a similar reduction of *A. Parlinii*, *A. petaloidea*, *A. Brainerdii*, and probably other species now recognized in the floras of Eastern North America.

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NOTES ON VERNONIA

BERNICE G. SCHUBERT

IN organizing the North American material of the genus Vernonia at the Gray Herbarium, the following two changes in rank seem necessary; the first, from a purely taxonomic point of view, and the second from both taxonomic and nomenclatorial considerations.

VERNONIA SCABERRIMA Nutt. var. **pulchella** (Small), comb. nov. *V. pulchella* Small, Bull. Torrey Club, xxv. 145 (1898).

In 1898 Small established *Vernonia pulchella* as a species, defining it as related to *V. scaberrima* Nutt. and adding "It is, however, more robust in habit, and has larger serrate leaves which are destitute of the peculiar base characteristic of *Vernonia scaberrima*. The tips of the involucral bracts are more slender and less rigid than those of its relative."

The type specimen, collected by Small "on sand hills bordering the Altamaha River swamps in Liberty county, Georgia, in July 1895," is a plant with leaves varying in character of the base from acute to definitely amplexicaul. Surely this plant, obviously related to *V. scaberrima* Nutt. in all its characters, which presents in its leaf-character a series clearly including the *V. scaberrima* type (subamplexicaul base), in large proportion, cannot justifiably be separated as a distinct species.

Comparison of the leaves of Small's type, kindly loaned by Dr. Gleason, with fragments of *V. scaberrima* from the herbarium of Dr. Baldwin shows close similarity, a lower leaf of Baldwin's specimen conforming almost exactly to Small's description; and a note with the above fragments in Dr. Asa Gray's handwriting indicates that the lowest leaves were "broadish." Therefore, judging from the size of the leaves found, the lowest leaves were certainly comparable in size to those of Small's specimen. Another specimen of *V. scaberrima* in the Gray Herbarium, from the Herbarium of the Academy of Natural Sciences in Philadelphia, which was examined for the Synoptical Flora of North America, has leaves almost identical with the upper leaves of a specimen identified as *V. pulchella* by H. A. Gleason and collected by A. H. Curtiss in Oct. 1880 in "dry pine barrens, Altamaha River, Georgia," obviously close to the type locality. The right-hand specimen on sheet No. 161 and an unnumbered sheet collected at the same time and place by Curtiss conform in leaf-character to Small's type; but, while the specimen of one sheet has involucral bracts typical of Small's *V. pulchella*, the other two on sheet No. 161 have the involucral bracts "filiformly terminated as in *V. noveboracensis*" which is in accordance with Nuttall's description of *V. scaberrima* Nutt. Gen. ii. 134 (1818). Since there can be no clear differentiation on the basis of leaf-character it seems justifiable to designate Small's type and specimens close to it in both character of leaves and involucral bracts as a variety of *V. scaberrima* which differs from the species only in the involucre. The bracts of the varietal type are definitely recurved, whereas in the specific forms they are erect or spreading and, if recurved, never to the extent or with the regularity of the varietal type.

VERNONIA BALDWINI Torr., var. **interior** (Small), comb. nov. *V. interior* Small, Bull. Torr. Bot. Club xxvii. 279 (1900).

From a nomenclatorial point of view the status of the two forms, *Vernonia Baldwini* Torr. and *V. interior* Small, has long been uncertain, because of absolute violation of rules of priority by various students of the group.

Vernonia Baldwini was established as a species by Torrey, Ann. Lyc. N. Y. ii 211 (1827); *V. interior* was established by Small seventy-three years later in Bull. Torrey Club xxvii. 279 (1900). Since Small, various students have felt that these two forms are close enough taxonomically so that specific rank is unjustifiable for both. The only valid procedure, therefore, is to reduce the later species to a variety of the earlier, leading to the combination *V. Baldwini* Torr., var. *interior* (Small). However, this step was not taken directly. In 1902 Mackenzie and Bush (Man. Fl. Jackson Co. Mo. 190) reduced *V. Baldwini* Torr. to a variety of *V. interior* Small, producing the combination *V. interior* Small var. *Baldwini* (Torr.) Mackenzie and Bush.

In 1906 Gleason (A Revision of the North American Vernonieae, Bull. N. Y. Bot. Gard. iv. 153. (1906) stated that, nomenclatorially, the procedure of Mackenzie and Bush was invalid and that the name should be *V. Baldwini interior*, but he also maintained that, based on taxonomic characters and geographical distribution *V. Baldwini* was only an eastern form of the more widely distributed *V. interior*, and, as such, should be maintained as the variety, regardless of nomenclatorial ruling. Gleason's mere statement of the proper combination does not constitute publication, because, according to international ruling "A name of a taxonomic group is not validly published unless it is definitely accepted by the author who publishes it. . . ." (Art. 37 ter. from Rec. Syn. 41, 1930; and Brit. Prop., Art. 44, p. 16, 1929. See also Sprague, Journ. Bot. lxxiv. 75 (1936).) Definitely, Dr. Gleason rejects the proper combination in the very act of stating it, and in the same paper applies his description of the form in question to the name *V. interior Baldwini.*

From a taxonomic standpoint the two forms in question are closely related. Dr. Robinson, in his treatment of the genus for Gray's Manual (7th edition), noted, after his discussion of *V. Baldwini:* "*V. interior* Small, though sometimes distinguishable by its less squarrose mostly purple-tinged bracts, does not appear satisfactorily separable."

The chief character for differentiation between the two forms lies in the involucral bracts. In *V. Baldwini* Torr. essentially all the bracts are squarrose to reflexed, in *V. interior* Small only a few bracts of any given involucre are squarrose or reflexed. The distinction between the two forms has been proven by a close study of herbarium specimens. Dr. Gleason in his latest study of the group maintains that the bracts of *V. Baldwini* are pubescent and resinous within the squarrose or reflexed tips, and that the bracts of *V. interior* are glabrous within. However, an examination of herbarium material proved that in most cases where any involucral bracts of specimens of *V. interior* were reflexed there was a certain amount of pubescence or resin within. This difference, then, is also one of degree. Therefore, since from a taxonomic standpoint one species is a variety of the other, according to nomenclatorial ruling the name of the variety should be established as *Vernonia Baldwini* Torr. var. *interior* (Small).

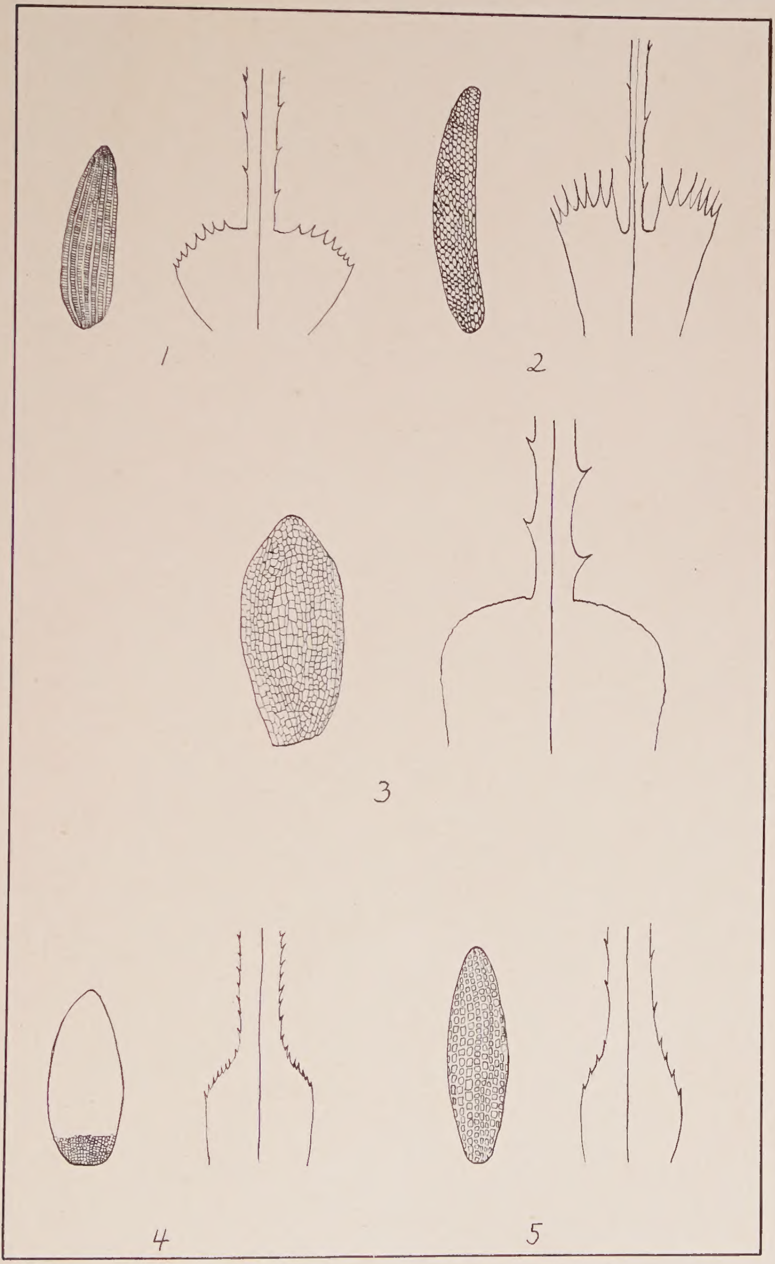
In conclusion I should like to express my appreciation to Professor M. L. Fernald for his interest and helpful suggestions throughout this study.

Radcliffe College.

Hypericum mutilum L., var. **latisepalum**, var. nov., sepalis late lanceolatis vel oblongis foliaceis.—Florida to Texas. Type: low grounds, Duval Co., Florida, June–August, *A. H. Curtiss*, no. 264* (distributed as *H. mutilum*, var. *gymnanthum*) in Gray Herb.

A characteristic southern extreme. Typical *Hypericum mutilum* L., as noted for me by Mr. C. A. Weatherby upon study of the type (*Clayton*, no. 232) in the summer of 1935 and as further demonstrated by a photograph of it secured by him through Mr. J. Ramsbottom, is the wide-spread plant with sepals linear or narrowly lanceolate, only one or two of them exceptionally broader. In var. *latisepalum* all the sepals are dilated.—M. L. Fernald, Gray Herbarium.

Volume 38, no. 453, including pages 301–332 and plate 436, was issued 19 September, 1936.



Leaf-bases, × 8, and seeds, × 8, of Najas.

Fig. 1, N. minor; fig. 2, N. gracillima; fig. 3, N. marina; fig. 4, N. flexilis; fig. 5, N. guadalupensis.

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